TM-1326B 2006−10

Eff. w/Serial Number LB170597

Processes

MIG (GMAW) Welding

Flux Cored (FCAW) Welding

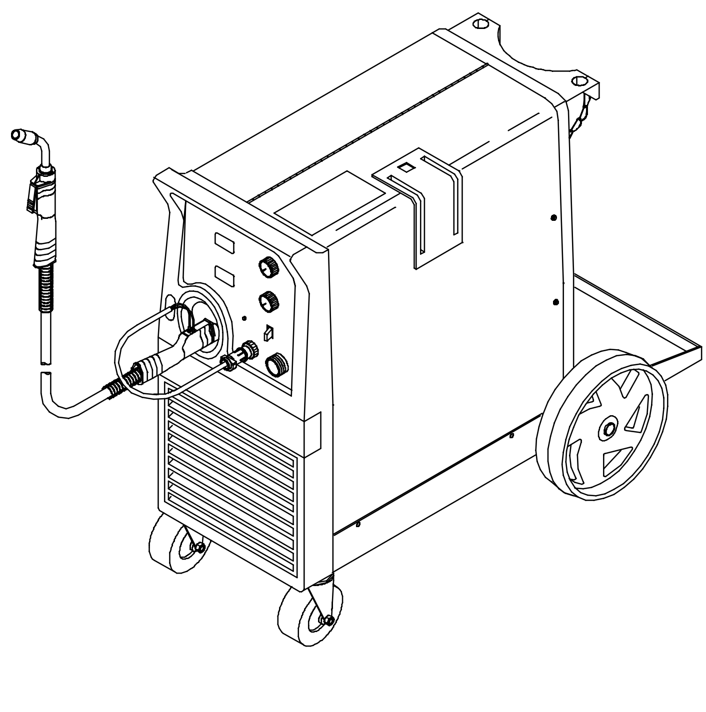
Description

CV DC 1 Phase

Arc Welding Power Source

and Wire Feeder

Millermatic® 251





Visit our website at

www.MillerWelds.com

TECHNICAL MANUAL

File: MIG (GMAW)

TABLE OF CONTENTS

SECTION 1 – SAFETY PRECAUTIONS FOR SERVICING

▲ **Warning: Protect yourself and others from injury — read and follow these precautions.**

1-1. Symbol Usage

OM-___ - Date, safety_stm 3/06



Means Warning! Watch Out! There are possible hazards with this procedure! The possible hazards are shown in the adjoining symbols.

▲ **Marks a special safety message.**

☞ *Means "Note"; not safety related.*



This group of symbols means Warning! Watch Out! possible ELECTRIC SHOCK, MOVING PARTS, and HOT PARTS hazards. Consult symbols and related instructions below for necessary actions to avoid the hazards.

1-2. Servicing Hazards

▲ **The symbols shown below are used throughout this manual to call attention to and identify possible hazards. When you see the symbol, watch out, and follow the related instructions to avoid the hazard.**

▲ **Only qualified persons should service, test, maintain, and repair this unit.**

▲ **During servicing, keep everybody, especially children, away.**

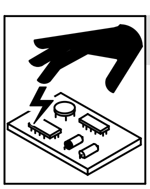


ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.
- Turn Off welding power source and wire feeder and disconnect and lockout input power using line disconnect switch, circuit breakers, or by removing plug from receptacle, or stop engine before servicing unless the procedure specifically requires an energized unit.
- Insulate yourself from ground by standing or working on dry insulating mats big enough to prevent contact with the ground.
- Do not leave live unit unattended.
- If this procedure requires an energized unit, have only personnel familiar with and following standard safety practices do the job.
- When testing a live unit, use the one-hand method. Do not put both hands inside unit. Keep one hand free.
- Disconnect input power conductors from deenergized supply line BEFORE moving a welding power source.

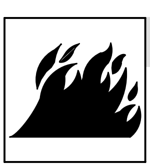
SIGNIFICANT DC VOLTAGE exists after removal of input power on inverters.

- Turn Off inverter, disconnect input power, and discharge input capacitors according to instructions in Troubleshooting Section before touching any parts.



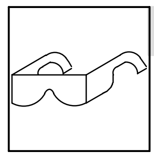
STATIC (ESD) can damage PC boards.

- Put on grounded wrist strap BEFORE handling boards or parts.
- Use proper static-proof bags and boxes to store, move, or ship PC boards.



FIRE OR EXPLOSION hazard.

- Do not place unit on, over, or near combustible surfaces.
- Do not service unit near flammables.



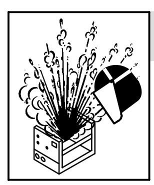
FLYING METAL or DIRT can injure eyes.

- Wear safety glasses with side shields or face shield during servicing.
- Be careful not to short metal tools, parts, or wires together during testing and servicing.



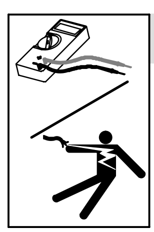
HOT PARTS can cause severe burns.

- Do not touch hot parts bare handed.
- Allow cooling period before working on equipment.
- To handle hot parts, use proper tools and/or wear heavy, insulated welding gloves and clothing to prevent burns.



EXPLODING PARTS can cause injury.

- Failed parts can explode or cause other parts to explode when power is applied to inverters.
- Always wear a face shield and long sleeves when servicing inverters.



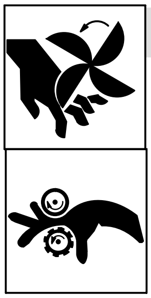
SHOCK HAZARD from testing.

- Turn Off welding power source and wire feeder or stop engine before making or changing meter lead connections.
- Use at least one meter lead that has a self-retaining spring clip such as an alligator clip.
- Read instructions for test equipment.



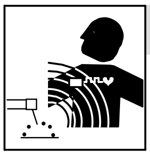
FALLING UNIT can cause injury.

- Use lifting eye to lift unit only, NOT running gear, gas cylinders, or any other accessories.
- Use equipment of adequate capacity to lift and support unit.
- If using lift forks to move unit, be sure forks are long enough to extend beyond opposite side of unit.



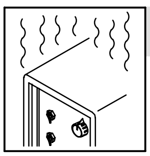
MOVING PARTS can cause injury.

- Keep away from moving parts such as fans.
- Keep away from pinch points such as drive rolls.
- Have only qualified persons remove doors, panels, covers, or guards for maintenance as necessary.
- Keep hands, hair, loose clothing, and tools away from moving parts.
- Reinstall doors, panels, covers, or guards when maintenance is finished and before reconnecting input power.



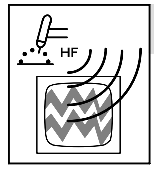
MAGNETIC FIELDS can affect pacemakers.

- Pacemaker wearers keep away from servicing areas until consulting your doctor.



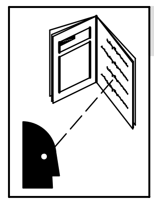
OVERUSE can cause OVERHEATING.

- Allow cooling period; follow rated duty cycle.
- Reduce current or reduce duty cycle before starting to weld again.
- Do not block or filter airflow to unit.



H.F. RADIATION can cause interference.

- High-frequency (H.F.) can interfere with radio navigation, safety services, computers, and communications equipment.
- Have only qualified persons familiar with electronic equipment install, test, and service H.F. producing units.
- The user is responsible for having a qualified electrician promptly correct any interference problem resulting from the installation.
- If notified by the FCC about interference, stop using the equipment at once.
- Have the installation regularly checked and maintained.
- Keep high-frequency source doors and panels tightly shut, keep spark gaps at correct setting, and use grounding and shielding to minimize the possibility of interference.



READ INSTRUCTIONS.

- Use Testing Booklet (Part No. 150 853) when servicing this unit.
- Consult the Owner's Manual for welding safety precautions.
- Use only genuine replacement parts from the manufacturer.

1-3. California Proposition 65 Warnings

▲ **Welding or cutting equipment produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code Section 25249.5 et seq.)**

▲ **Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. Wash hands after handling.**

For Gasoline Engines:

▲ **Engine exhaust contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.**

For Diesel Engines:

▲ **Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.**

1-4. EMF Information

Considerations About Welding And The Effects Of Low Frequency Electric And Magnetic Fields

Welding current, as it flows through welding cables, will cause electromagnetic fields. There has been and still is some concern about such fields. However, after examining more than 500 studies spanning 17 years of research, a special blue ribbon committee of the National Research Council concluded that: "The body of evidence, in the committee's judgment, has not demonstrated that exposure to power-frequency electric and magnetic fields is a human-health hazard." However, studies are still going forth and evidence continues to be examined. Until the final conclusions of the research are reached, you may wish to minimize your exposure to electromagnetic fields when welding or cutting.

To reduce magnetic fields in the workplace, use the following procedures:

1. Keep cables close together by twisting or taping them.
2. Arrange cables to one side and away from the operator.
3. Do not coil or drape cables around your body.
4. Keep welding power source and cables as far away from operator as practical.
5. Connect work clamp to workpiece as close to the weld as possible.

About Pacemakers:

Pacemaker wearers consult your doctor before welding or going near welding operations. If cleared by your doctor, then following the above procedures is recommended.

SECTION 2 – DEFINITIONS

2-1. Symbols And Definitions

	Wire Feed		Output	X	Duty Cycle		Do Not Switch While Welding
V	Volts		Increase	I	On	O	Off
	Gas Metal Arc Welding (GMAW) Gun		Wire Feed Spool Gun		Gas Input		Gas Output
	Voltage Input		Press To Reset	U_0	Rated No-Load Voltage (Average)		

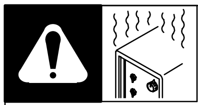
SECTION 3 – INSTALLATION

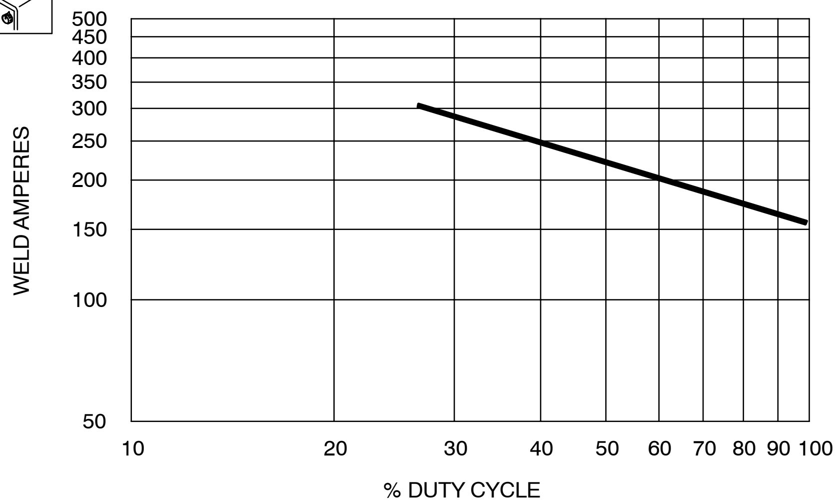
3-1. Specifications

Rated Output		Max. Open Circuit Voltage	Amps Input at Rated Output (60% Duty Cycle), 50 or 60 Hz, Single-Phase						
			200 (208) V	230 V	400 V	460 V	575 V	KVA	KW
250 A at 28 VDC, 40% Duty Cycle	200 A at 28 VDC, 60% Duty Cycle	38	48 2.3*	42 2*	24 1.2*	21 1*	17 0.8*	9.8 0.46*	7.5 0.13*

Wire Type and Diameter			Wire Feed Speed	Dimensions	Net Weight
Solid Steel	Stainless Steel	Flux Cored	25–700 IPM (.65–17.8 m/min)	H: 32 in (813 mm) W: 19 in (483 mm) D: 39 in (991 mm)	**215 lb (98 kg)**
.023 – .045 in (0.6 – 1.2 mm)	.023 – .045 in (0.6 – 1.2 mm)	.030 – .045 in (0.8 – 1.2 mm)			
* While idling					
Operating Temperature Range – −20C to +40C			Storage Temperature Range – -30C to + 50C		

3-2. Welding Power Source Duty Cycle And Overheating





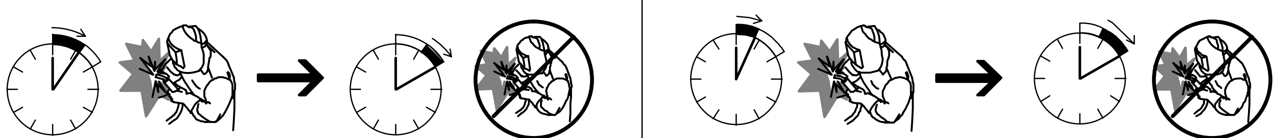
Duty Cycle is percentage of 10 minutes that unit can weld at rated load without overheating.

If unit overheats, Thermistor (T) opens, output stops, and cooling fan runs. Wait fifteen minutes for unit to cool. Reduce amperage or voltage, or duty cycle before welding.

▲ **Exceeding duty cycle can damage unit and void warranty.**

60% Duty Cycle At 200 Amperes

40% Duty Cycle At 250 Amperes



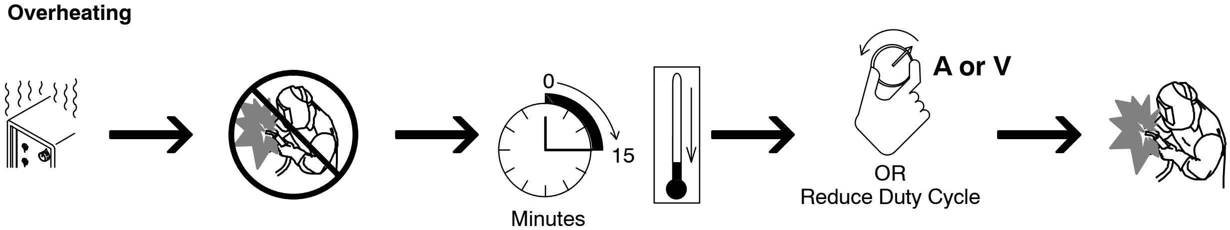
6 Minutes Welding

4 Minutes Resting

4 Minutes Welding

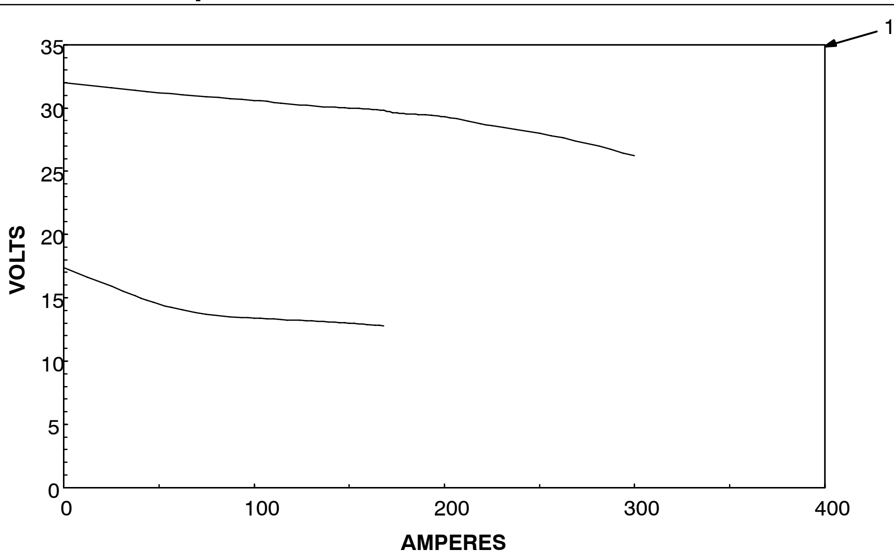
6 Minutes Resting

Overheating



duty1 4/95 – 150 215-A

3-3. Volt-Ampere Curves

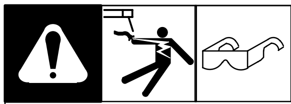


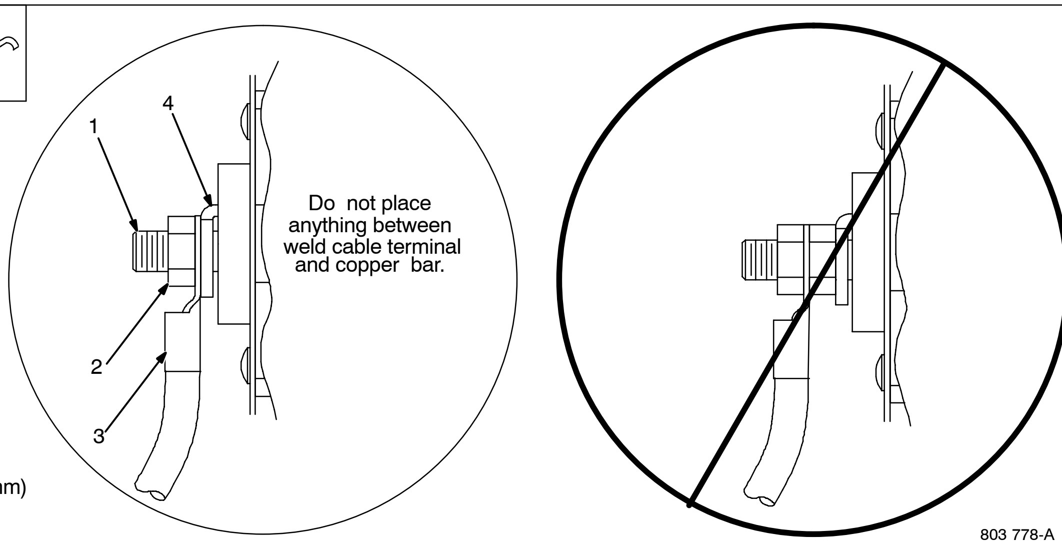
1 Normal Volt-Ampere Curves

The volt-ampere curves show the normal minimum and maximum voltage and amperage output capabilities of the welding power source. Curves of other settings fall between the curves shown.

ssb1.1 10/91 – 196 844 / S-0700

3-4. Connecting To Weld Output Terminals





Tools Needed:

3/4 in (19 mm)

Correct Installation

Incorrect Installation

▲ **Turn off power before connecting to weld output terminals.**

▲ **Failure to properly connect weld cables may cause excessive heat and start a fire, or damage your machine.**

1 Weld Output Terminal

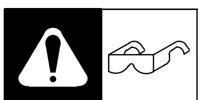
2 Supplied Weld Output Terminal Nut

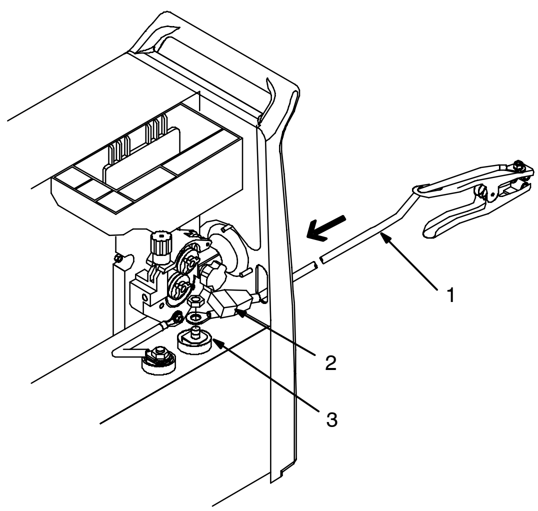
3 Weld Cable Terminal

4 Copper Bar

Remove supplied nut from weld output terminal. Slide weld cable terminal onto weld output terminal and secure with nut so that weld cable terminal is tight against copper bar. **Do not place anything between weld cable terminal and copper bar. Make sure that the surfaces of the weld cable terminal and copper bar are clean.**

3-5. Installing Work Cable And Clamp





Tools Needed:

3/4 in

Ref. 802 474-E

1 Work Cable

2 Boot

Route cable through front panel opening. Slide boot onto work cable.

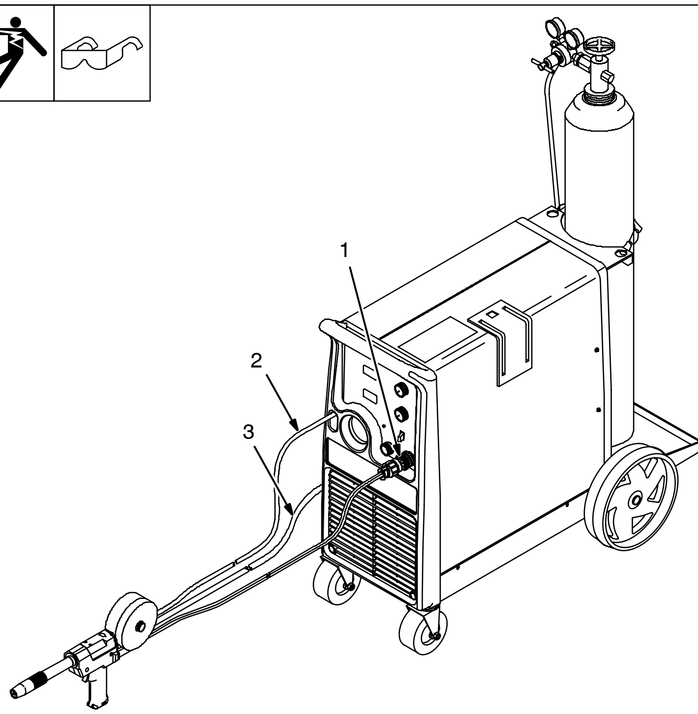
3 Negative (–) Output Terminal

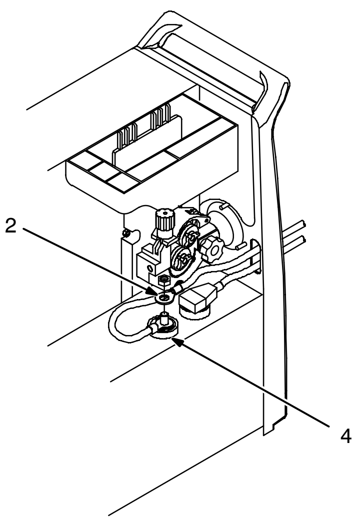
Connect cable to terminal and cover connection with boot.

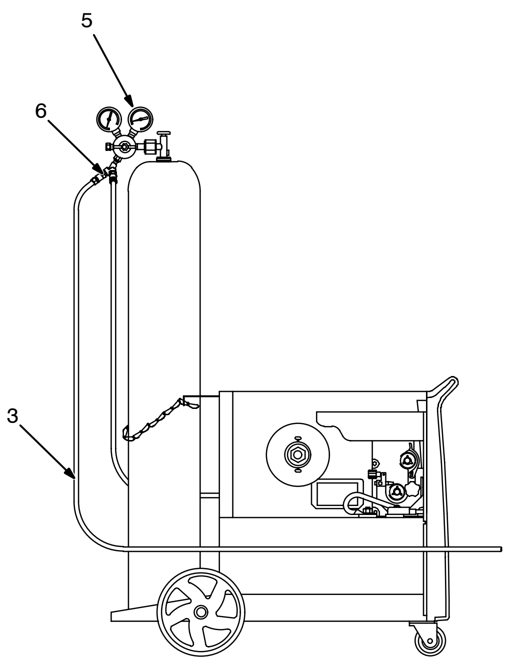
Close door.

3-6. Connecting Spoolmatic® 15A Or 30A Gun









1 Gun Trigger Plug

Insert plug into receptacle, and tighten threaded collar.

2 Weld Cable

3 Shielding Gas Hose

Route weld cable through opening in front panel.

Route gas hose along side panel.

4 Positive Weld Output Terminal

Connect weld cable to weld output terminal.

5 Regulator/Flowmeter

6 Y-Adapter Fitting

Route shielding gas hose up to regulator/flowmeter. Connect gas hose to Y-adapter fitting on regulator/flowmeter.

☞ *Two welding guns may be connected to the welding power source at the same time, but only one welding gun may be in use at any one time. If the triggers of both welding guns are pulled at the same time, the weld output and wirefeed motor are disabled.*

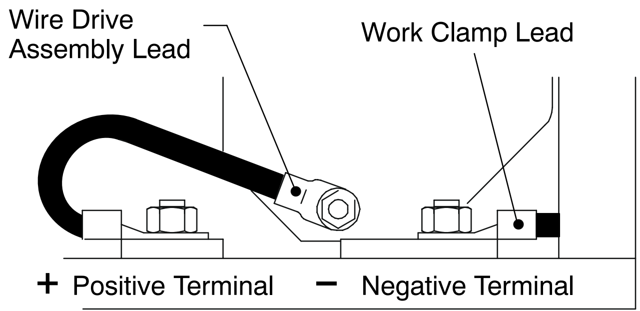
Tools Needed:

3/4, 5/8 in

804 455-A

3-7. Setting Gun Polarity For Wire Type

Changing Polarity



Shown as shipped – **Electrode Positive** (DCEP): For solid steel, stainless steel, aluminum, or flux core with gas wires (GMAW).

Electrode Negative (DCEN): Reverse lead connections at terminals from that shown above for gasless flux core wires (FCAW). Drive assembly becomes negative.

1 Polarity Changeover Label Information

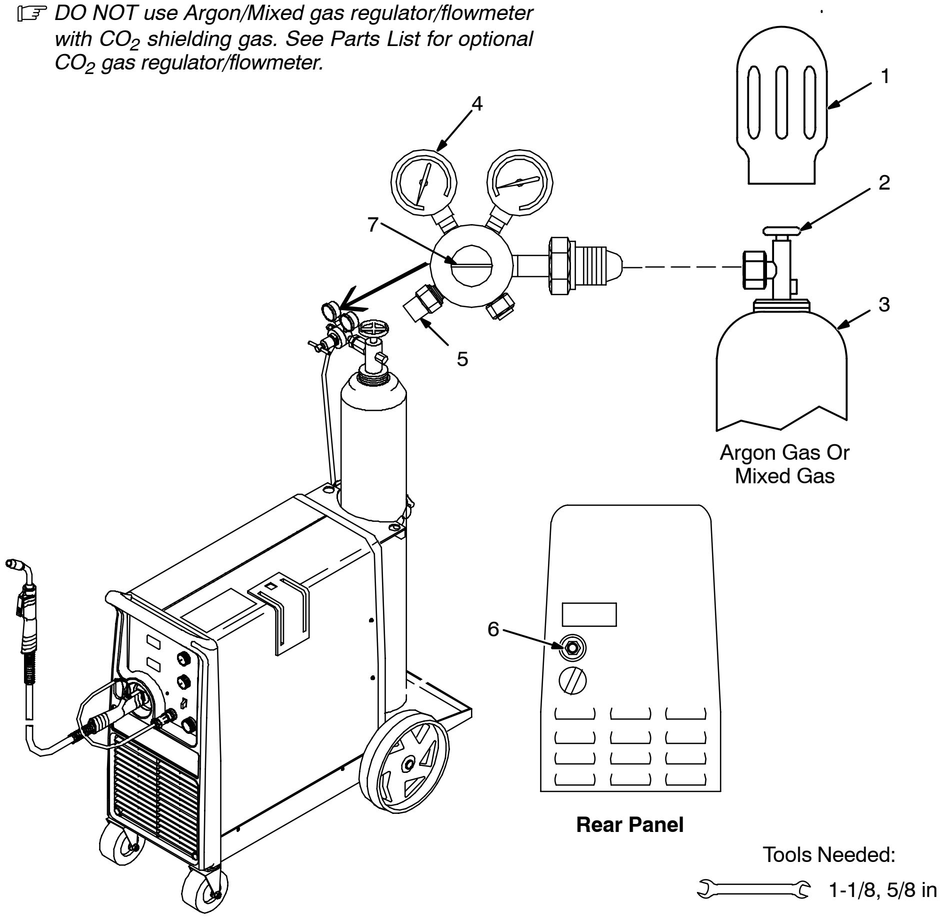
Always read and follow manufacture's recommended polarity.

3/4, 11/16 in

Ref. 190 821-A

3-8. Installing Gas Supply

☞ *DO NOT use Argon/Mixed gas regulator/flowmeter with CO_2 shielding gas. See Parts List for optional CO_2 gas regulator/flowmeter.*



Obtain gas cylinder and chain to running gear, wall, or other stationary support so cylinder cannot fall and break off valve.

1 Cap

2 Cylinder Valve

Remove cap, stand to side of valve, and open valve slightly. Gas flow blows dust and dirt from valve. Close valve.

3 Cylinder

4 Regulator/Flowmeter

Install so face is vertical.

5 Regulator/Flowmeter Gas Hose Connection

6 Welding Power Source Gas Hose Connection

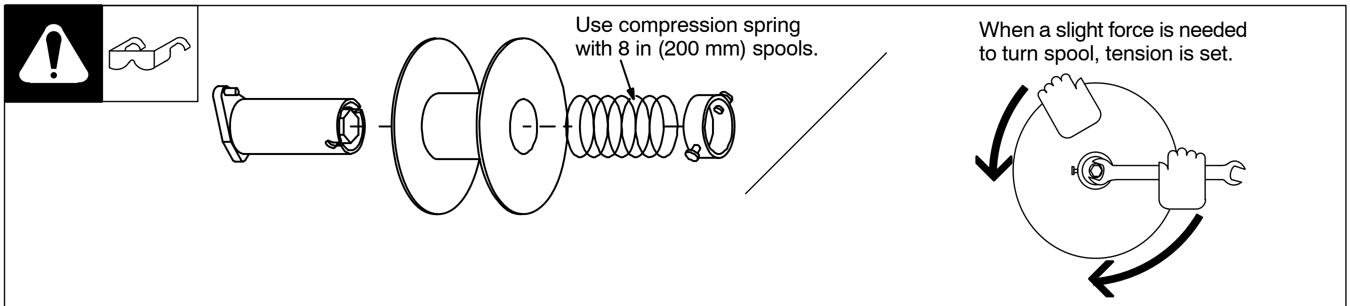
Connect customer supplied gas hose between regulator/flowmeter gas hose connection, and fitting on rear of welding power source.

7 Flow Adjust

Typical flow rate is 20 cfh (cubic feet per hour). Check wire manufacturer's recommended flow rate.

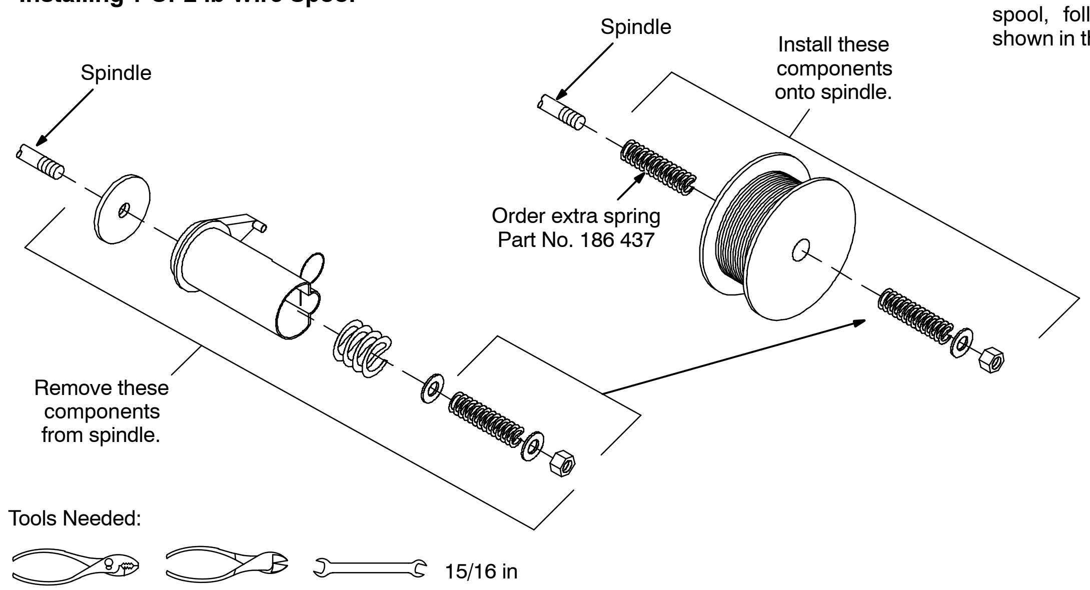
802 028-A / Ref. 802 477-B

3-9. Installing Wire Spool And Adjusting Hub Tension



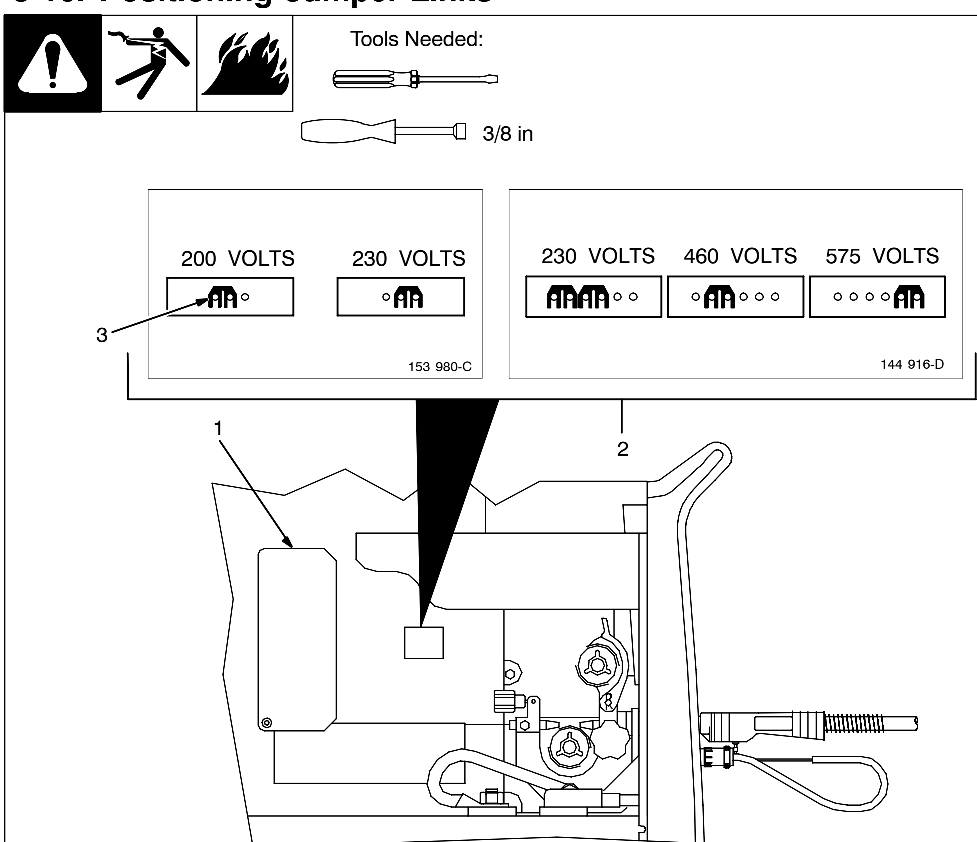
Installing 1 Or 2 lb Wire Spool

To install either a 1 lb or 2 lb wire spool, follow the procedure as shown in the illustration.



072573-B / 802 922

3-10. Positioning Jumper Links



Check input voltage available at site.

1 Jumper Links Access Door

Open door.

2 Jumper Link Label

Check label – only one is on unit.

3 Input Voltage Jumper Links

Move jumper links to match input voltage.

Close and secure access door.

Ref. 802 476-D

3-11. Electrical Service Guide

Input Voltage	200	230	400	460	575
Input Amperes At Rated Output	48	42	24	21	17
Max Recommended Standard Fuse Or Circuit Breaker Rating In Amperes					
Circuit Breaker [1], Time-Delay [2]	60	50	30	25	20
Normal Operating [3]	70	60	35	30	25
Min Input Conductor Size In AWG[4]	8	8	12	12	14
Max Recommended Input Conductor Length In Feet (Meters)	96 (29)	127 (39)	156 (47)	206 (63)	209 (64)
Min Grounding Conductor Size In AWG[4]	8	10	12	12	14

Reference: 2005 National Electrical Code (NEC) (including article 630)

1 Choose a circuit breaker with time-current curves comparable to a Time Delay Fuse.

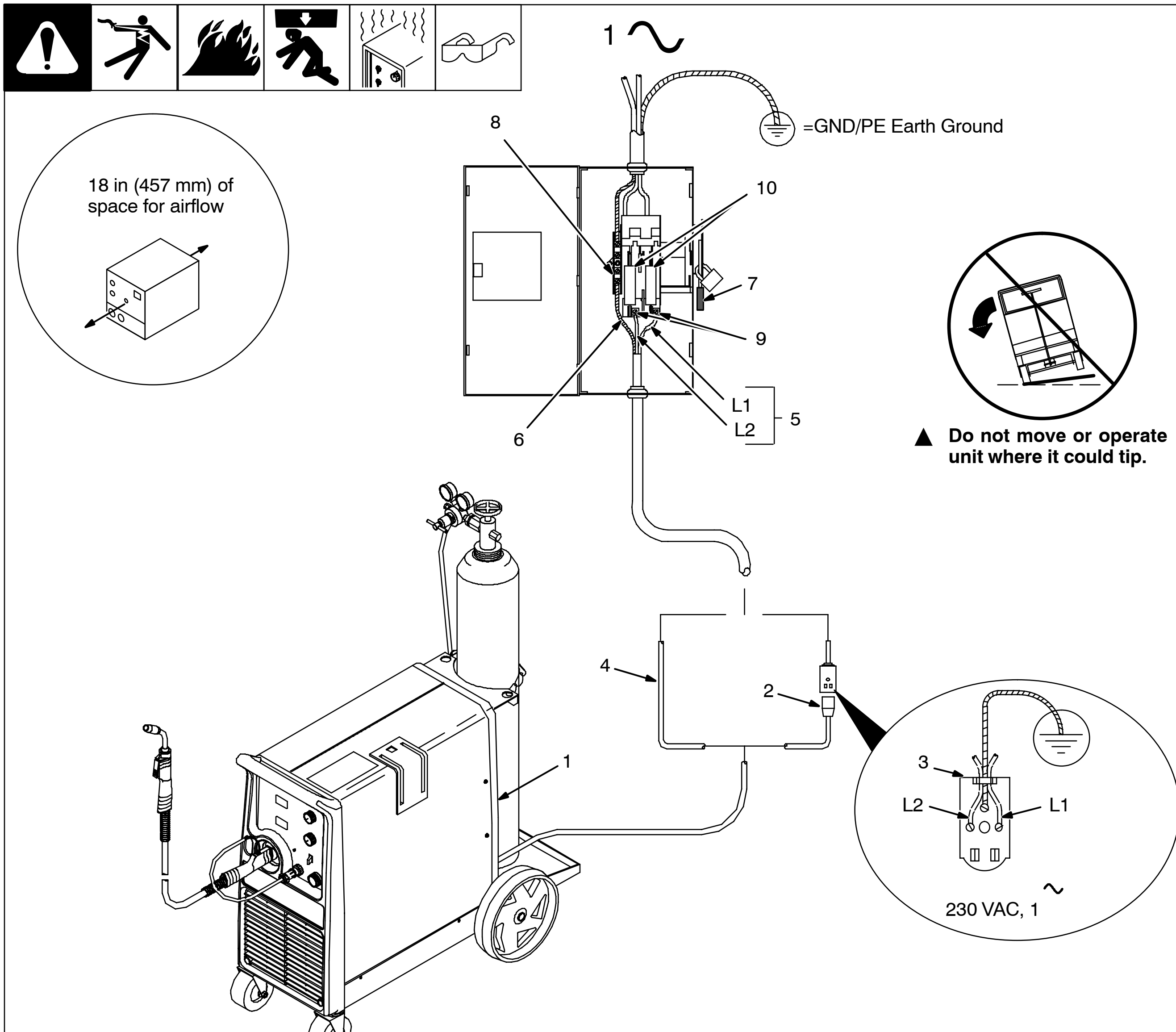
2 “Time-Delay” fuses are UL class “RK5” .

3 “Normal Operating” (general purpose – no intentional delay) fuses are UL class “K5” (up to and including 60 amp), and UL class “H” (65 amp and above).

4 Conductor data in this section specifies conductor size (excluding flexible cord or cable) between the panelboard and the equipment per NEC Table 310.16. If a flexible cord or cable is used, minimum conductor size may increase. See NEC Table 400.5(A) for flexible cord and cable requirements.

▲ **Caution: Failure to follow these fuse and circuit breaker recommendations could create an electric shock or fire hazard. These recommendations are for a dedicated branch circuit that applies to the rated output and duty cycle of the welding power source.**

3-12. Selecting A Location And Connecting Input Power



Ref. 802 477-B / 803 766-B

▲ **Installation must meet all National and Local Codes – have only qualified persons make this installation.**

▲ **Disconnect and lockout/tagout input power before connecting input conductors from unit.**

▲ **Always connect green or green/yellow conductor to supply grounding terminal first, and never to a line terminal.**

▲ **Special installation may be required where gasoline or volatile liquids are present – see NEC Article 511 or CEC Section 20.**

1 Rating Label

Supply correct input power.

2 Plug (NEMA Type 6-50P)

3 Receptacle [NEMA Type 6-50R (Customer Supplied)]

4 Input Power Cord.

Connect directly to line disconnect device if hard wiring is required.

5 Black And White Input Conductor (L1 And L2)

6 Green Or Green/Yellow Grounding Conductor

7 Disconnect Device (switch shown in the OFF position)

8 Disconnect Device Grounding Terminal

9 Disconnect Device Line Terminals

Connect green or green/yellow grounding conductor to disconnect device grounding terminal first.

Connect input conductors L1 and L2 to disconnect device line terminals.

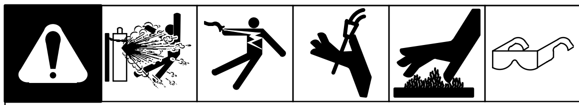
10 Over-Current Protection

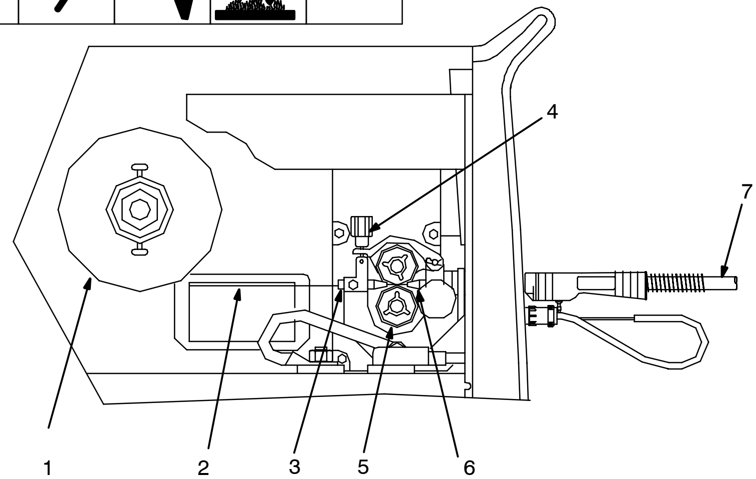
Select type and size of over-current protection using Section 3-11 (fused disconnect switch shown).

Connect plug to receptacle if hard wiring method is not used.

Close and secure door on disconnect device. Remove lockout/tagout device, and place switch in the On position.

3-13. Threading Welding Wire

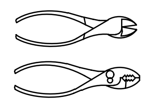


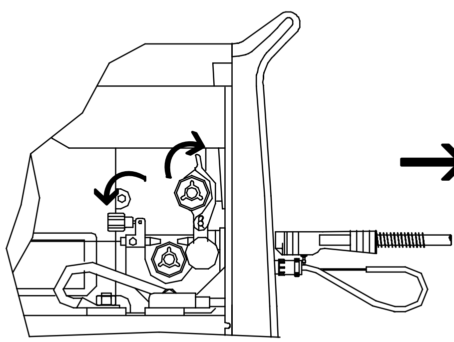


1 Wire Spool
2 Welding Wire
3 Inlet Wire Guide
4 Pressure Adjustment Knob
5 Drive Roll
6 Outlet Wire Guide
7 Gun Conduit Cable

Lay gun cable out straight.

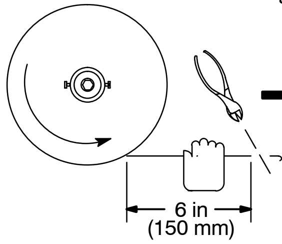
Tools Needed:



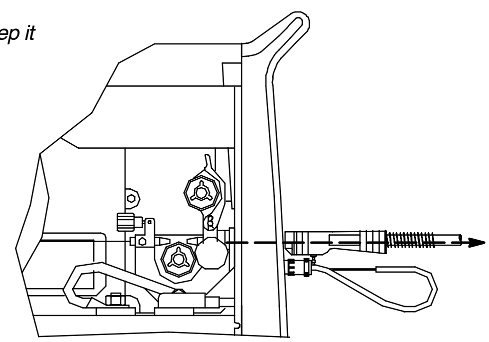


Open pressure assembly.

☞ *Hold wire tightly to keep it from unraveling.*

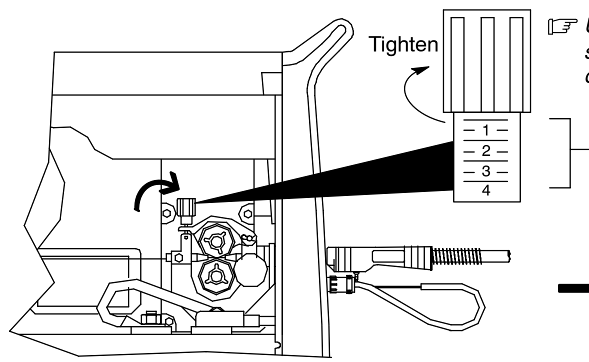


Pull and hold wire; cut off end.

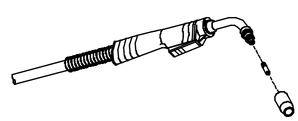


Push wire thru guides into gun; continue to hold wire.

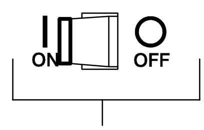
☞ *Use pressure indicator scale to set a desired drive roll pressure.*



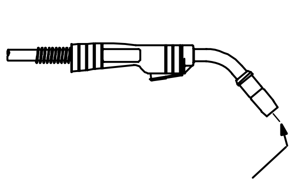
Close and tighten pressure assembly, and let go of wire.



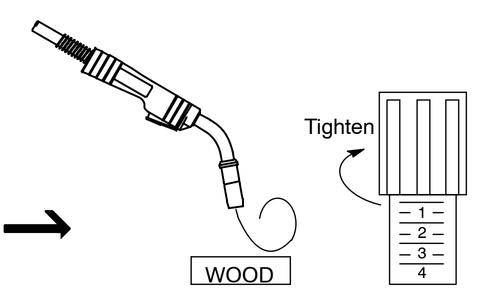
Remove gun nozzle and contact tip.



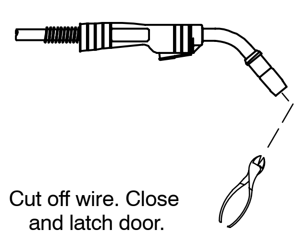
Turn On.



Press gun trigger until wire comes out of gun. Reinstall contact tip and nozzle



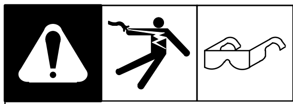
Feed wire to check drive roll pressure. Tighten knob enough to prevent slipping.

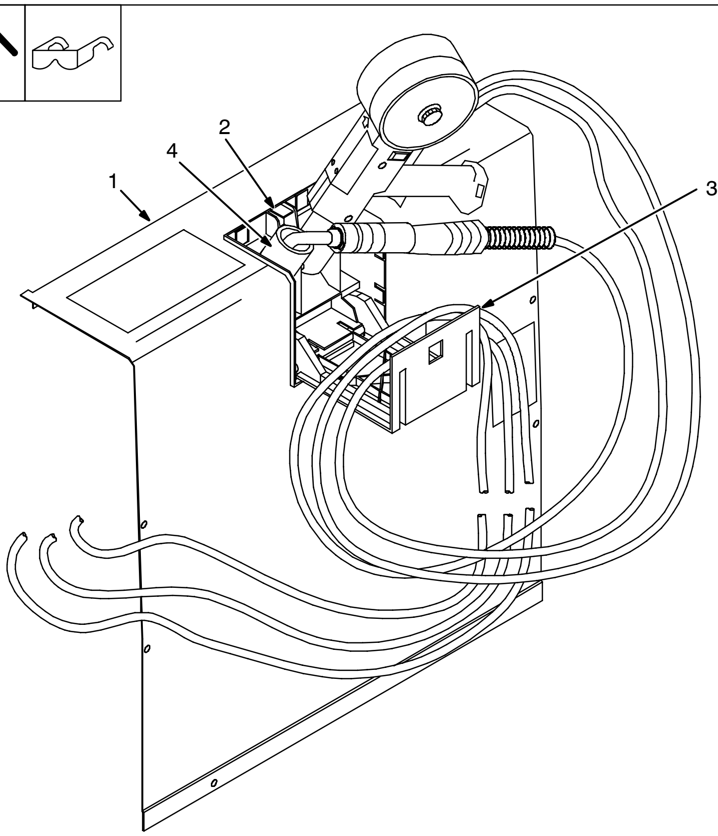


Cut off wire. Close and latch door.

Ref. 802 064-D / S-0627-A

3-14. Using Gun/Cable Holder





1 Side Panel

2 Latch

3 Cable Holder

Press latch down to release and open door.

4 Holster (2)

Wrap cable around cable holder, and place gun nozzle into holster.

Ref. 802 726-A

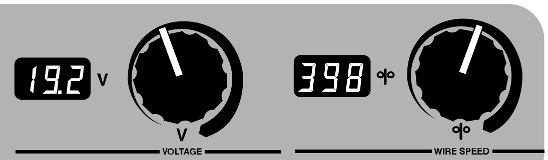
Notes

3-15. Weld Parameters

Selecting Wire, Gas and Control Settings

What Material are You Welding?	Suggested Wire Types	Suggested Shielding Gases and Flow Rate	Wire Sizes (Diameter)
Steel	Solid (or hard) ER70S-6	100% CO_2, 25 cfh	0.023" (0.6mm)
			0.030" (0.8mm)
			0.035" (0.9mm)
			0.045" (1.1mm)
		75% Ar/25% CO_2, 25 cfh (Ar/CO_2 produces less spatter - better overall appearance)	0.023" (0.6mm)
			0.030" (0.8mm)
			0.035" (0.9mm)
			0.045" (1.1mm)
Steel – for outdoor, windy applications or when weld appearance is not critical.	Flux core E71T-11	No shielding gas required	0.035" (0.9mm)
			0.045" (1.1mm)
	Flux core E71T-1	100% CO_2, 25 cfh 75% Ar/25% CO_2, 25 cfh	0.035" (0.9mm)
			0.045" (1.1mm)
Stainless steel	Stainless steel ER 308, ER 308L ER 308LSi	Tri-Mix, 35 cfh (90% He/7.5% Ar/2.5% CO_2)	0.023" (0.6mm)
			0.030" (0.8mm)
			0.035" (0.9mm)
			0.045" (1.1mm)
Aluminum with Optional Spoolmatic® 15A or 30A spoolgun.	Aluminum 4043 ER	100% Ar, 35 cfh	0.030" (0.8mm)
			0.035" (0.9mm)
			0.047" (1.2mm)

Select Voltage and Wire Speed Based on Thickness of Metal Being Welded

To read settings: Number on left of slash is voltage, number on right of slash is wire-speed. "—" Means not recommended. **Example:** 19.2/398 = 

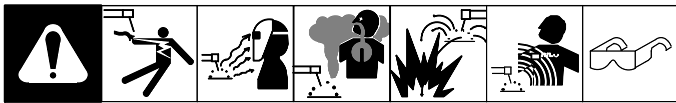
Wire speed listed is a starting value only and can be fine-tuned while welding.

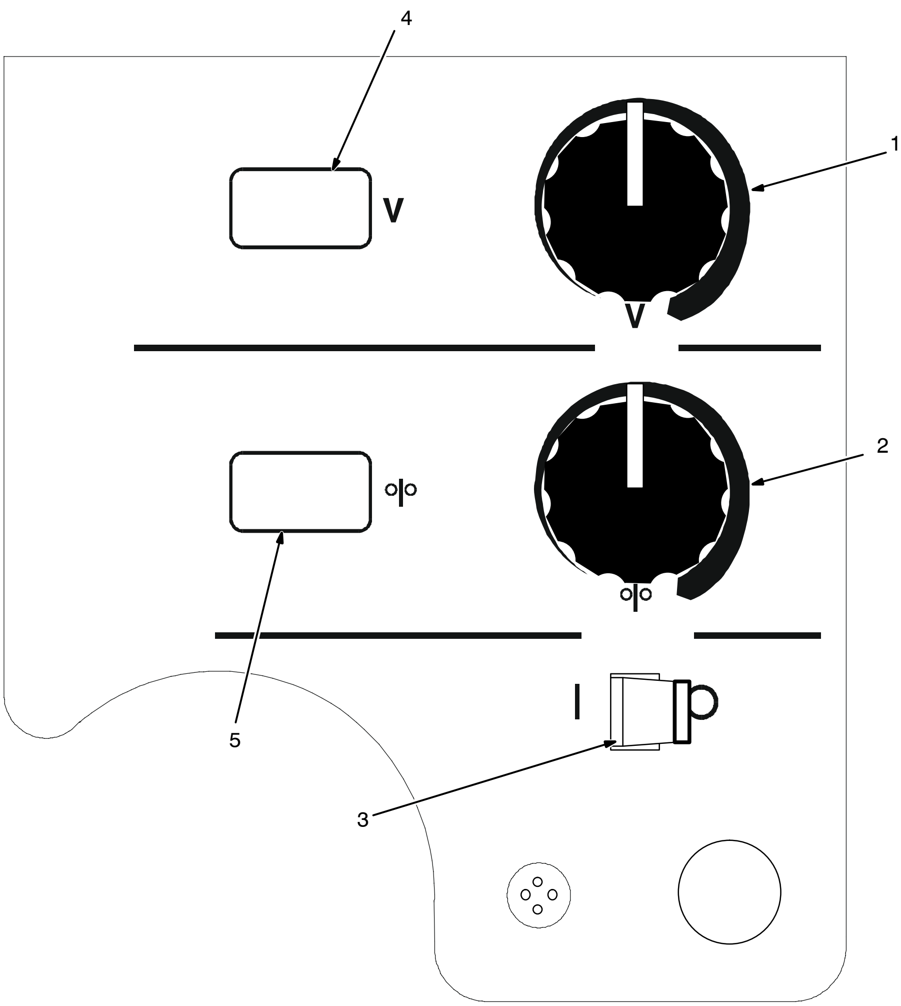
1/2" (12.7 mm)	3/8" (9.5 mm)	1/4" (6.4 mm)	3/16" (4.8 mm)	1/8" (3.2 mm)	14 ga. (2.0 mm)	16 ga. (1.6 mm)	18 ga. (1.2 mm)	20 ga. (0.9 mm)	22 ga. (0.8 mm)
—	—	—	—	20.0/320	19.0/280	18.5/220	18.0/190	17.6/170	17.0/140
—	22.5/420	21.5/380	20.5/325	19.5/295	19.0/230	18.5/185	18.0/135	17.5/120	17.0/105
—	23.0/325	21.5/290	20.5/245	20.0/220	19.0/175	18.5/160	18.0/125	17.5/100	17.0/85
—	—	—	19.5/510	18.0/385	17.0/300	16.5/240	15.5/180	15.3/140	15.0/130
—	22.0/530	19.6/435	18.5/375	17.0/305	16.5/235	16.0/210	15.5/170	15.0/130	14.5/110
23.5/475	21.5/425	19.0/320	18.0/280	17.0/245	16.5/200	16.0/165	15.5/135	15.0/110	14.5/95
24.5/335	21.5/300	19.0/260	18.0/230	17.0/200	16.5/165	16.0/155	15.5/110	—	—
—	16.5/250	15.5/225	15.0/210	14.5/180	14.2/120	14.0/105	—	—	—
—	17.5/170	16.5/130	15.5/110	15.0/90	14.5/70	—	—	—	—
—	24.0/385	23.0/360	21.5/310	20.5/275	20.0/250	—	—	—	—
25.5/380	24.5/340	23.0/305	21.5/265	20.5/240	20.0/210	—	—	—	—
—	—	—	—	21.0/500	19.5/360	18.5/270	18.0/250	—	—
—	—	22.5/500	21.5/480	21.0/420	19.5/360	18.5/250	17.5/220	—	—
—	24.5/485	22.5/440	21.5/400	20.0/350	19.0/275	18.5/225	—	—	—
—	24.0/330	22.5/310	21.5/285	20.5/275	—	—	—	—	—
—	—	23.0/570	21.0/500	19.0/450	18.5/425	—	—	—	—
—	25.0/615	23.0/520	21.5/450	19.0/400	18.5/375	—	—	—	—
—	24.5/445	22.5/375	21.0/305	19.0/265	—	—	—	—	—

201 202-A

SECTION 4 – OPERATION

4-1. Controls





☞ ***This unit has three automatic timers included in its operation to help save contact tips, gas, and wire:***

Tip Saver *– Weld output shuts off if tip is shorted to work surface.*

Safety shut-off *– Weld output will shut off if no arc is detected within 3 seconds after gun trigger is depressed.*

Jog mode *– When loading a new roll of wire or if the gun trigger is accidentally pressed, gas will shut off after 1 minute and wire will shut off after 2 minutes saving wire and gas.*

1 Voltage Control

Turn control clockwise to increase voltage.

2 Wire Speed Control

Turn control clockwise to increase wire feed speed.

JOG Mode

If the trigger on either gun is held for more than 3 seconds without striking an arc, the unit will automatically shut off weld power (and shielding gas output on MIG gun only), but will feed wire continuously at the preset wire feed speed (which may be faster or slower than Run–in Speed) until trigger is released.

Run–in Wire Feed Speed Settings

Run–in settings for the MIG and Spool Guns are independently set and stored in unit memory. The settings are in percent of the welding wire feed speed preset. Both settings are adjustable from 25 to 150 percent.

MIG Gun Run–in is factory set at 100% which is recommended for most wire sizes and types.

Spool Gun Run–in is factory set at 50% which is recommended for .030 & .035 wire. A Run–in setting of 25% is recommended for .047 wire.

To **check Run–in** settings, start with the power switch OFF. Press and hold the MIG or Spool Gun Trigger while turning the power switch ON. The unit will power up with both the displays reading 888 , then the voltage display will read ––– and the wire feed display will read the preset Run–in percentage from memory for the gun selected. To return to the weld mode without making a change, simply release trigger and pull the trigger again momentarily (one second).

To **change Run–in** settings, start with the power switch OFF. Press and hold the MIG or Spool Gun Trigger while turning the power switch ON. The unit will power up with both the displays reading 888 , then the voltage display will read ––– and the wire feed display will read the preset Run–in percentage from memory for the gun selected. To change the Run–in value, release the trigger and turn the wire feed control knob (or the wire feed adjustment knob located on the bottom handle of the spool gun) to the desired setting for the selected gun. To return to weld mode after the Run–in speed change, pull the trigger momentarily (one second).

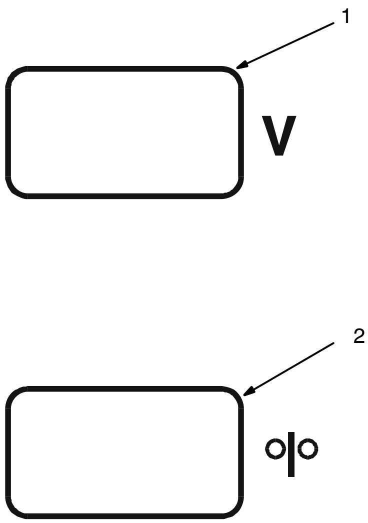
3 Power Switch

4 Voltmeter

5 Wire Feed Speed Meter

Ref. 205 637

4-2. Voltmeter And Wire Feed Speed Meter Operation



1 Voltmeter

2 Wire Feed Speed Meter

Power Up Status

Both meters display 888 at unit power up. After one second, preset values appear on both meters. The MIG gun settings (not spool gun) are always the default at initial power up of the unit. If the power is reset to quickly, characters other than 888 may appear. To reset, turn power off for at least 3 seconds, then turn power back on.

Welding Status

When either a MIG gun or spool gun trigger is pressed and a welding arc is established, the voltmeter displays actual weld voltage. When the gun trigger is released and welding arc extinguished, the voltmeter displays the last actual voltage for 5 seconds and then returns to preset voltage.

If welding resumes before unit displays preset voltage, actual welding voltage will appear on the voltmeter.

The wire feed speed meter always displays preset wire feed speed (IPM).

Gun Selection

The wire feed speed meter will display preset wire feed speed (IPM) for the appropriate gun selection either MIG or spool gun. To preset desired wire feed speed, connect desired gun, press gun trigger for one second, and release trigger. The meter preset will be retained by the meter board until a different gun is connected and preset is performed or the unit is turned off and back on. The MIG gun settings (not spool gun) are always the default at initial power up of the unit.

Error Messages

Volt Meter Display (HL.P)

Wire Feed Speed Display (001)

HL.P 001 – Communication Lost between Control Board PC1 and Display Board PC2

HL.P 002 – Unit over temperature, unit is inoperative until temperature is reduced inside unit (see Section 6-1)

HL.P 003 – No Open Circuit Voltage (OCV) detected when either trigger is pulled

HL.P 004 – Gun trigger was engaged for approximately 2 minutes with no arc detected, or weld wire is stuck causing a direct short. If HL.P 004 occurs during power up, see Section 6-1.

HL.P 005 – Wire feed malfunction. Check wire feed delivery system (see Section 6-1).

See Section 6-1 for additional information on all HL.P codes.

SECTION 5 – THEORY OF OPERATION

A. Block Diagram

1 Power Switch S1

Turns unit on and off.

2 Input Terminal Board TE1

Provides means for operation on different input voltages.

3 Main Transformer T1

Supplies power to weld output circuit, main control board PC1, other control circuits, and fan motor FM.

4 Fan Motor FM

Controlled by thermistor, and fan control relay CR1.

5 Rectifier SR1

SR1 Changes the ac output from T1 to full-wave rectified dc.

6 Capacitor Bank C5, Burden Resistor R1

C5 filters the dc output voltage of SR1; R1 discharges C5 when unit is not triggered.

7 Stabilizer Z1

Smooths out current to positive (+) output terminal on wire drive assembly.

Start winding and contactor W changes characteristic of stabilizer Z1 during arc start operation.

8 Positive (+) And Negative (–) Output Terminals

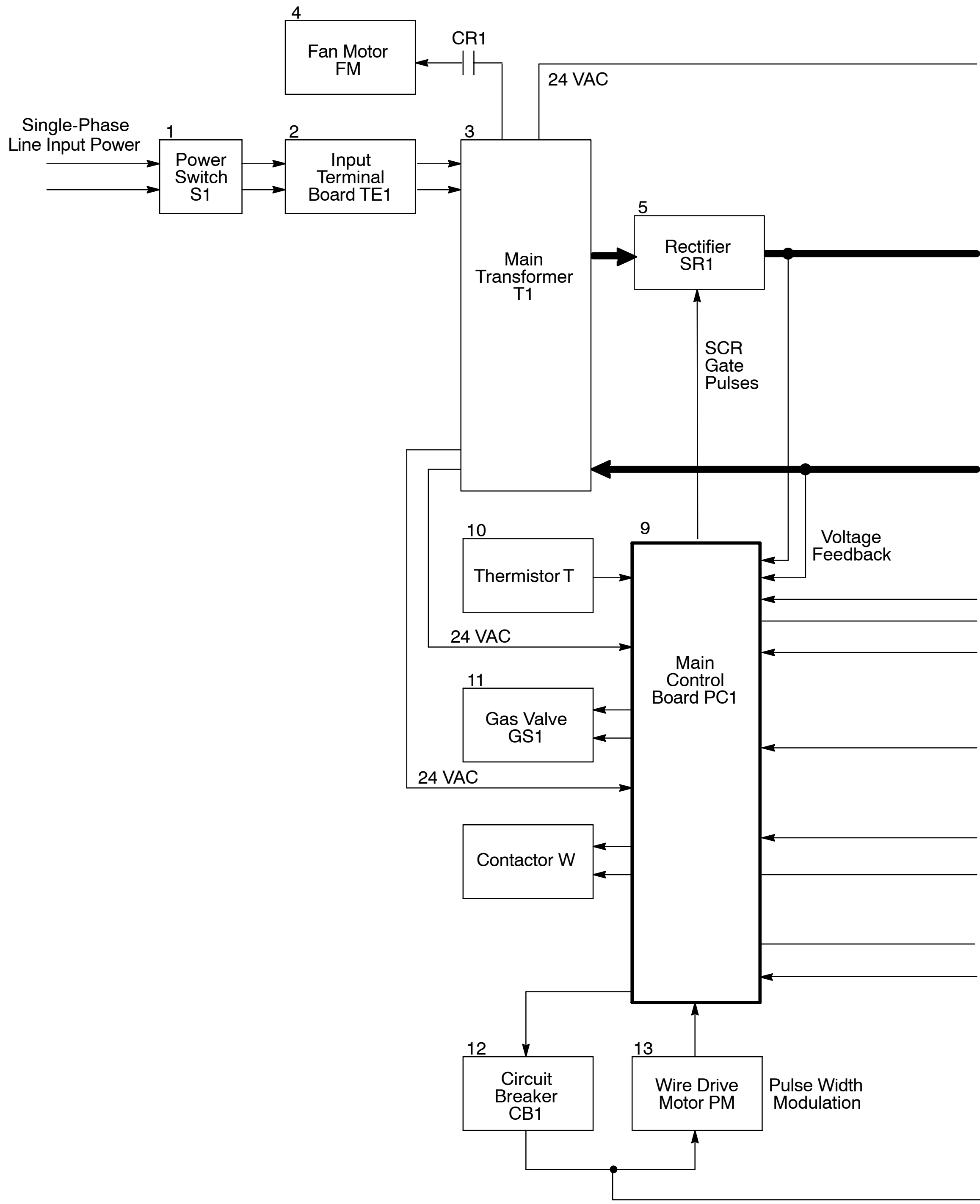
Provide weld output and allow changing of output polarity.

9 Main Control Board PC1

Controls weld output by changing the SCR gate pulses (conduction times) after comparing voltage feedback signal to selected voltage signal.

Monitors unit temperature.

Controls wire speed by changing the pulse width modulation signal (wider or narrower pulses meaning more or less voltage to motor) after comparing motor speed feedback voltage signal to selected voltage signal.



10 Thermistor T

If unit overheats, PC1 disables unit stopping all weld output.

11 Gas Valve GS1

Controlled by circuitry on main control board PC1.

12 Circuit Breaker CB1

CB1 Protects wire drive motor PM and spool gun motor circuits.

13 Wire Drive Motor PM

Feeds wire at a speed set by R3.

14 Wire Speed Control R3

Selects wire speed.

15 Voltage Control R2

Selects weld output voltage level.

16 Gun Trigger Receptacle RC1

Connects gun trigger circuit to welding power source.

17 Receptacle RC7

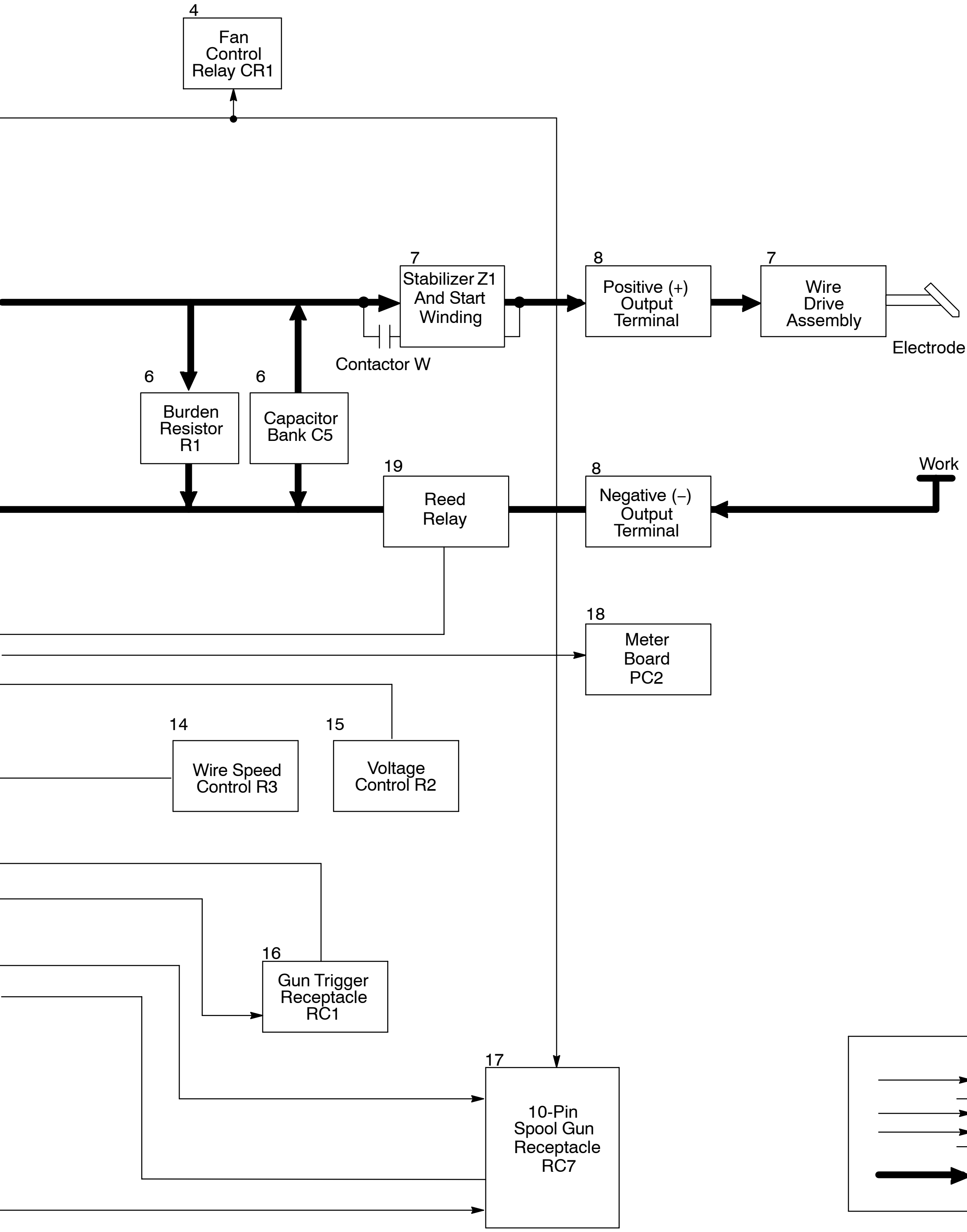
Connects optional Spoolmatic 30A welding gun.

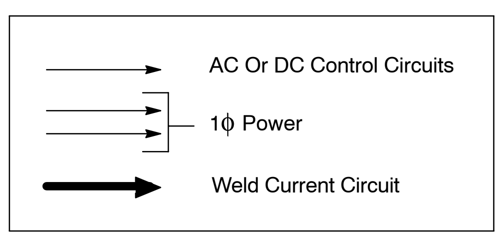
18 Meter Board PC2

Voltmeter, Wire Feed Speed meter, and HELP message displays.

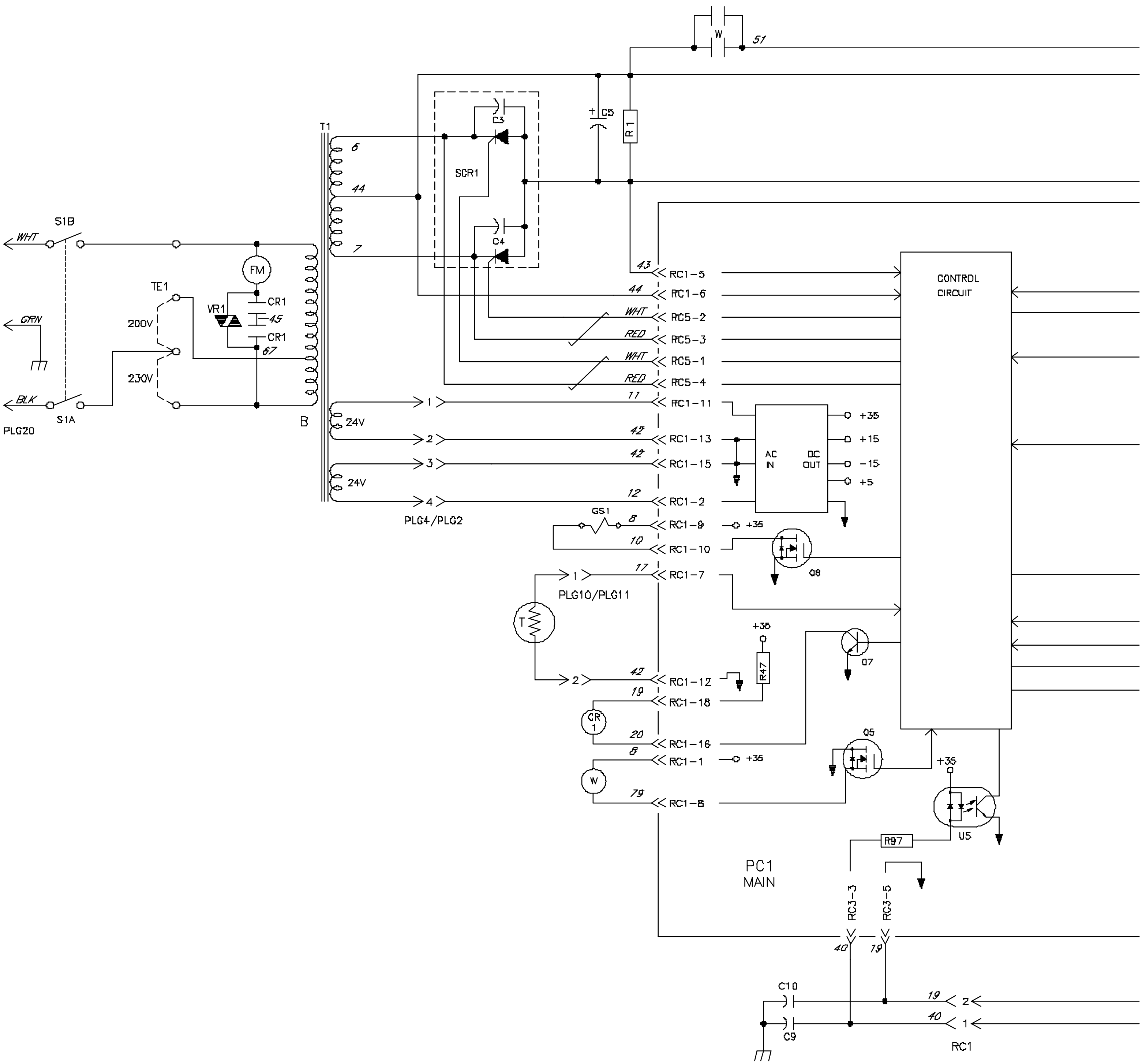
19 Reed Relay

Senses weld current and changes mode from start to weld.



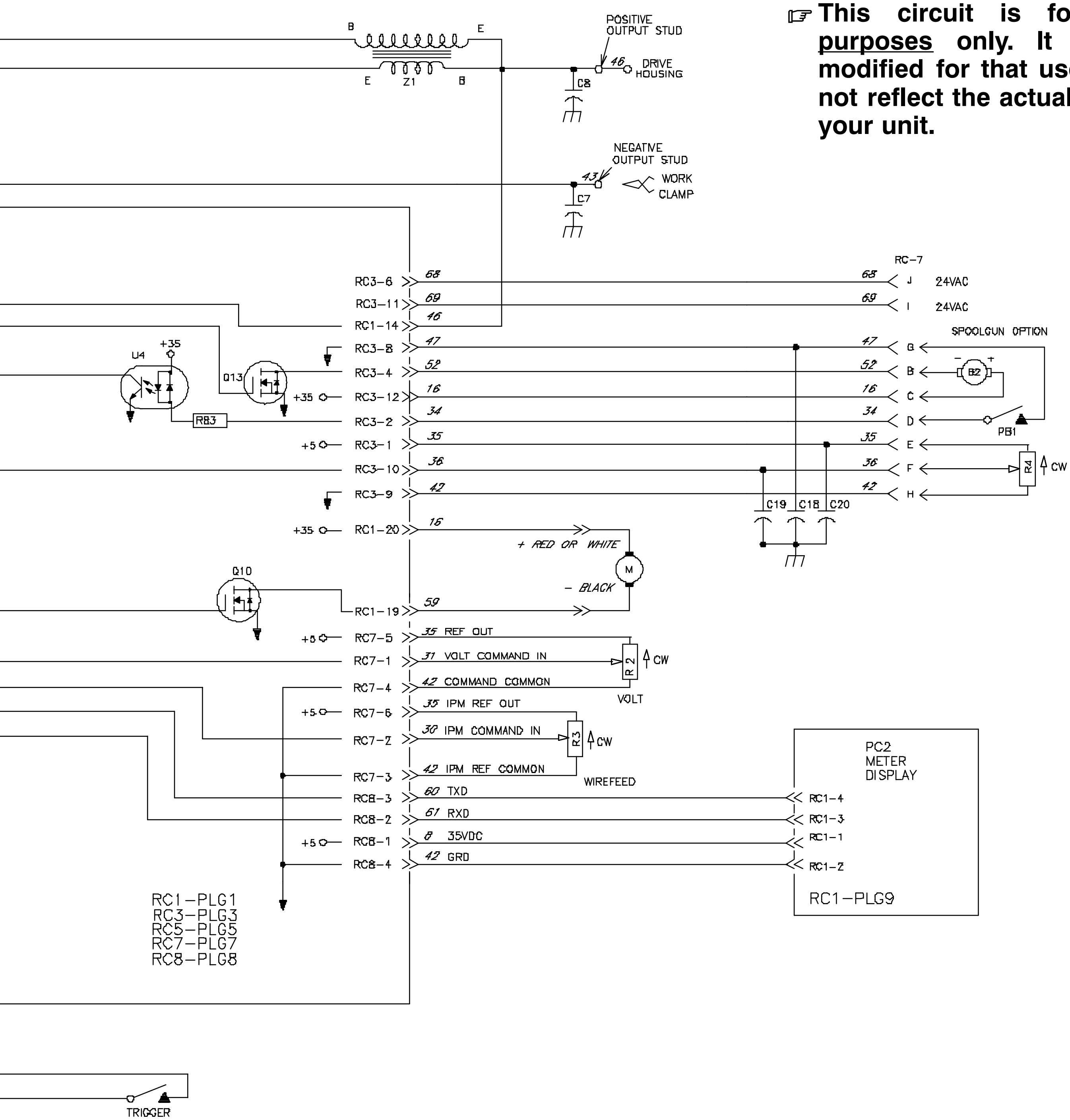


B. Basic Training Circuit



⚠ WARNING	• Do not touch live electrical parts. • Disconnect input power or stop engine before servicing. • Do not operate with covers removed. • Have only qualified persons install, use, or service this unit.
ELECTRIC SHOCK HAZARD	

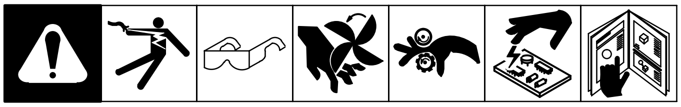
☞ **This circuit is for <u>training purposes</u> only. It has been modified for that use and may not reflect the actual circuit for your unit.**



211 408-C

SECTION 6 – TROUBLESHOOTING

6-1. Troubleshooting Table



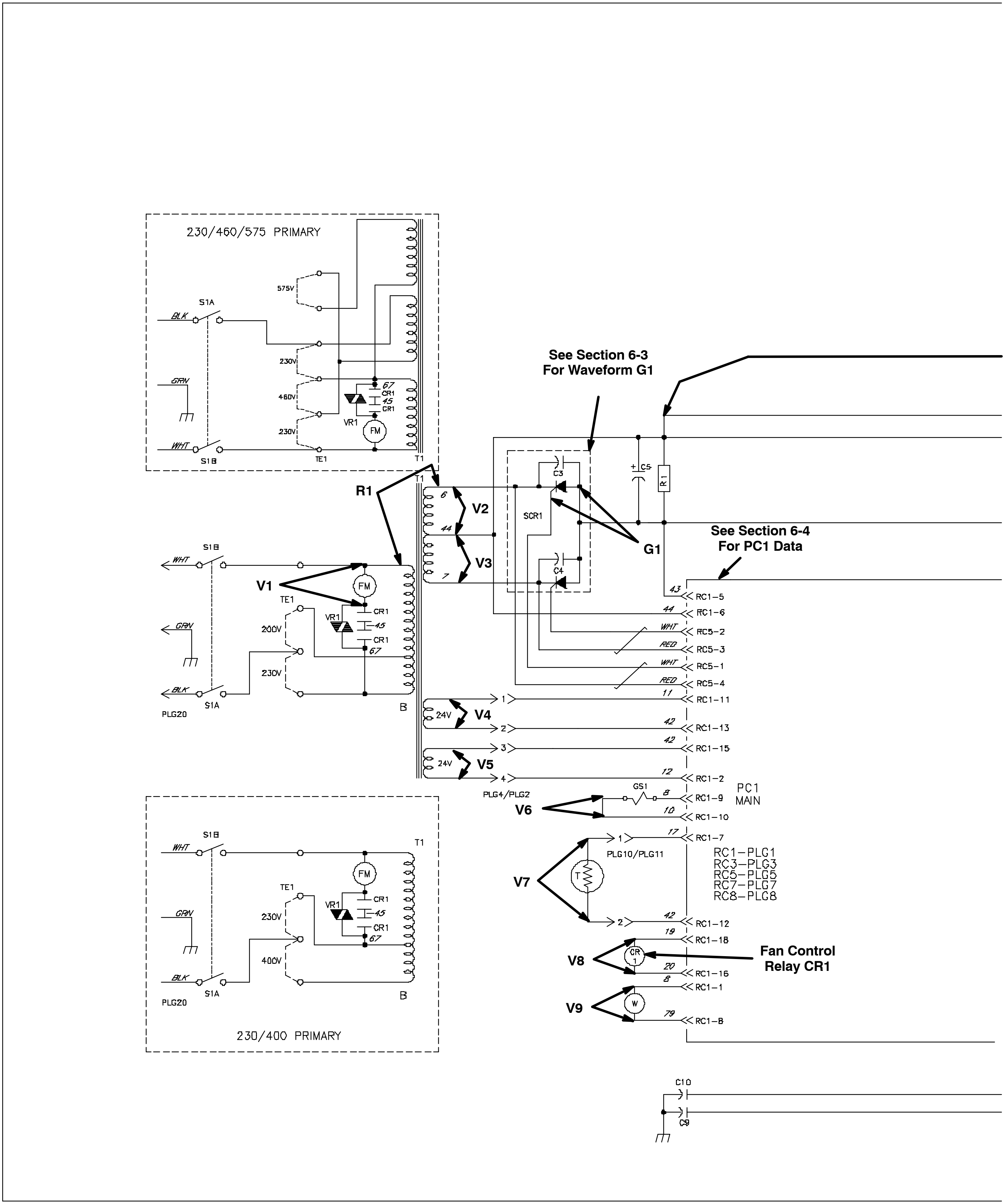
☞ *See Section 6-2 for test points and values and Section 9 for parts location.*

☞ *Use MILLER Testing Booklet (Part No. 150 853) when servicing this unit.*

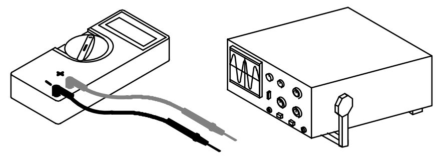
Trouble	Remedy
No weld output; wire does not feed.	Be sure line disconnect switch is On (see Section 3-12).
	Replace building line fuse or reset circuit breaker if open (see Section 3-12).
	Secure gun trigger connections (see welding gun Owner's Manual).
	Check continuity of Power switch S1, and replace if necessary.
	Check stabilizer Z1 for signs of winding failure. Check continuity across windings, and check for proper connections. Replace Z1 if necessary.
	Check main transformer T1 for signs of winding failure. Check continuity across windings, and check for proper connections. Check secondary voltages. Replace T1 if necessary.
	Check main control board PC1 and connections, and replace if necessary (see Section 6-4).
	HL.P 002 appears on meters. Thermistor T is detecting an overheating condition. Wait for unit to cool allowing the fan to run. After unit is cool, If HL.P 002 message remains, have Factory Authorized Service Agent check for an open Thermistor T (see Section 7-2).
	HL.P 004 appears on meters. Reset message by releasing the trigger or removing stuck wire causing short circuit (see Section 4-2) . If message remains, have Factory Authorized Service Agent check for shorted trigger leads.
	HL.P 004 appears on meters during power up. Have Factory Authorized Service Agent check for shorted contacts in the Reed Relay.
No weld output; wire feeds.	Thermistor T detecting overheating condition. Allow fan to run; the thermistor will reset unit when cooled (see Section 7-2).
	Connect work clamp to get good metal-to-metal contact.
	Replace contact tip (see welding gun Owner's Manual).
	An overload condition occurred. Release gun trigger (see Section 7-2).
	HL.P 003 appears on meters, have Factory Authorized Service Agent check main control board and main rectifier.
	Check SCR's in main rectifier SR1, and replace if necessary.
	Check stabilizer Z1 for signs of winding failure. Check continuity across windings, and check for proper connections. Replace Z1 if necessary.
	Check main transformer T1 for signs of winding failure. Check continuity across windings, and check for proper connections. Check secondary voltages. Replace T1 if necessary.
	Check main control board PC1 and connections, and replace if necessary (see Section 6-4).

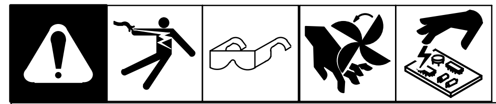
Trouble	Remedy
Low weld output.	Connect unit to proper input voltage or check for low line voltage (see Section 3-12).
	Check input voltage jumper links and correct position if necessary (see Section 3-10).
	Check main control board PC1 and connections, and replace if necessary (see Section 6-4).
Low, high, or erratic wire speed.	Readjust front panel settings (see Section 4-1).
	Change to correct size drive rolls (see Section 7-3).
	Readjust drive roll pressure (see Section 3-13).
	Replace inlet guide, contact tip, and/or liner if necessary (see welding gun Owner's Manual).
	Check position of input voltage jumper links (see Section 3-10).
	Check main control board PC1 and connections, and replace if necessary (see Section 6-4).
	Check hub tension setting (see Section 3-9)
No wire feed.	Rotate Wire Speed control R3 to higher setting (see Section 4-1).
	Clear obstruction in gun contact tip or liner (see welding gun Owner's Manual).
	Readjust drive roll pressure (see Section 3-13).
	Change to correct size drive rolls (see Section 7-3).
	Rethread welding wire (see Section 3-13).
	Check gun trigger and leads. Repair or replace gun if necessary.
	Check main transformer T1 for signs of winding failure. Check continuity across windings, and check for proper connections. Check secondary voltages. Replace T1 if necessary.
	Check main control board PC1 and connections, and replace if necessary (see Section 6-4).
	H002 message appears on displays to indicate thermistor T detected unit is in an overheated condition (see Section 4-2).
Improper or no gas flow.	Clean or replace gas hose.
	Clear blockage in gun.
	If gas flow is excessive, replace regulator.
	Check coil voltage and connections of gas valve GS1. Check continuity of coil. Replace GS1 if necessary.
	Check main control board PC1 and connections, and replace if necessary (see Section 6-4).
Fan motor FM not operating properly.	Check and clear blocked fan blade.
	Check coil voltage and connections of fan motor FM, and replace if necessary.
	Check coil voltage and connections of fan control relay CR1, Check continuity of coil and condition of contacts. Replace CR1 if necessary.

6-2. Troubleshooting Circuit Diagram For Welding Power Source



Test Equipment Needed:

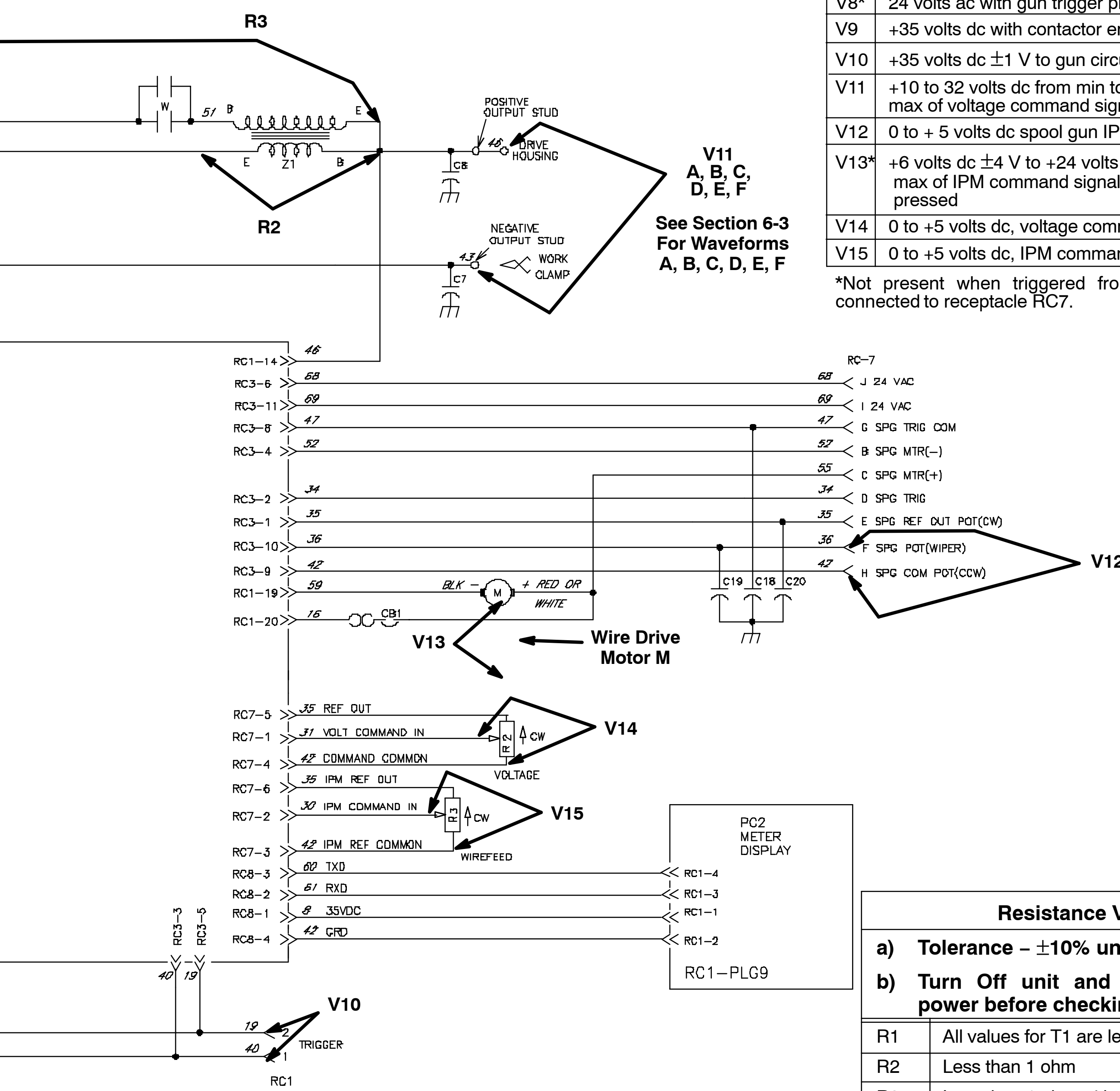




Voltage Readings:	
a)	Tolerance – ±10% unless specified
b)	Reference – to circuit common (lead 1) unless noted
c)	Wiring Diagram – see Section 8

V1	230 volts ac with fan control relay CR1 energized
V2, V3	28 volts ac with Power switch S1 On
V4, V5	24 volts ac with Power switch S1 On
V6*	+35 volts dc with gun trigger pressed
V7	varies with temperature from +1.5 to +4 volts dc
V8*	24 volts ac with gun trigger pressed
V9	+35 volts dc with contactor energized
V10	+35 volts dc ±1 V to gun circuit with gun trigger off
V11	+10 to 32 volts dc from min to max of voltage command signal
V12	0 to + 5 volts dc spool gun IPM command signal
V13*	+6 volts dc ±4 V to +24 volts dc ±3 V from min to max of IPM command signal with gun trigger pressed
V14	0 to +5 volts dc, voltage command signal
V15	0 to +5 volts dc, IPM command signal

*Not present when triggered from optional spool gun connected to receptacle RC7.



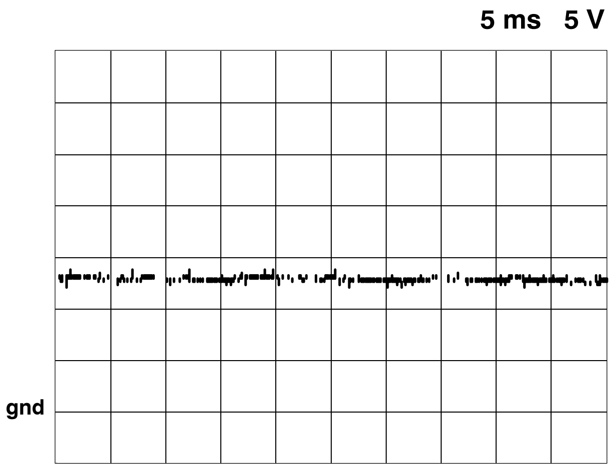
Resistance Values	
a)	Tolerance – ±10% unless specified
b)	Turn Off unit and disconnect input power before checking resistance

R1	All values for T1 are less than 1 ohm
R2	Less than 1 ohm
R3	Less than 1 ohm with contactor closed

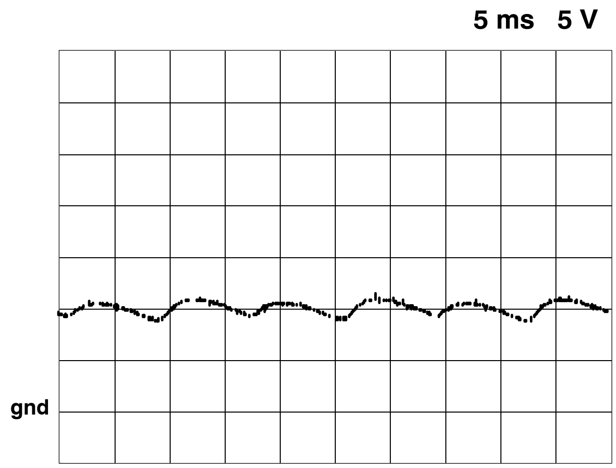
226 707-A

6-3. Waveforms For Section 6-2

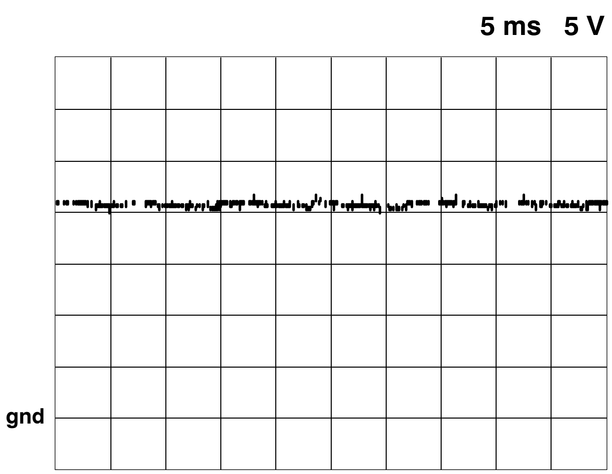
☞ *The waveforms represent the output of the welding power source. When operating properly, the power source waveforms match those shown here.*



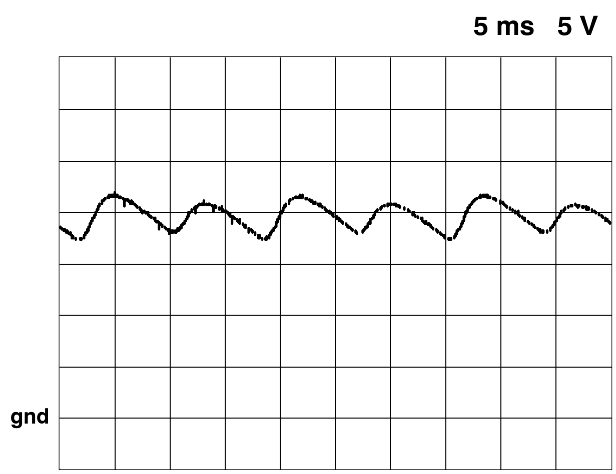
A. DC Open-Circuit Voltage, Voltage Control R2 At Minimum



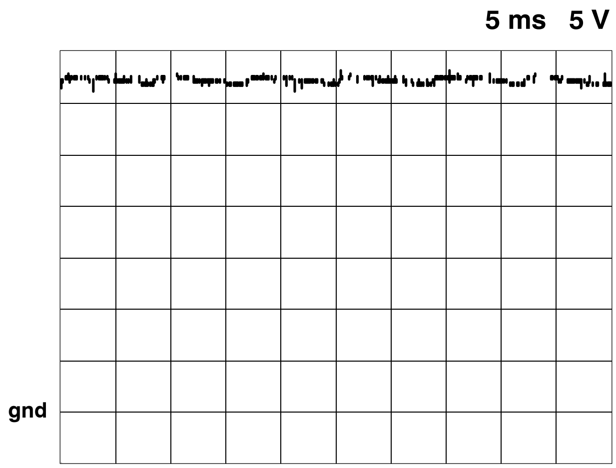
B. 9.3 Volts DC, 63 Amperes, Voltage Control R2 At Minimum (Resistive Load)



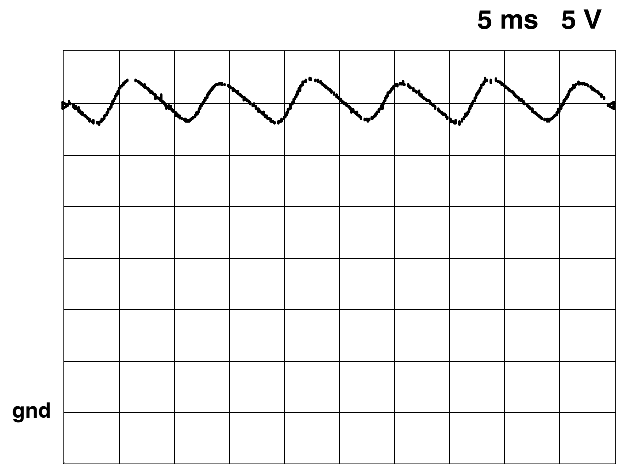
C. DC Open-Circuit Voltage, Voltage Control R2 At Midrange



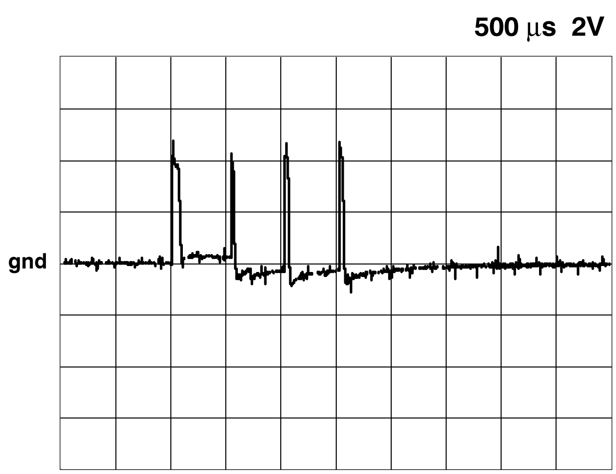
D. 19.9 Volts DC, 131 Amperes, Voltage Control R2 At Midrange (Resistive Load)



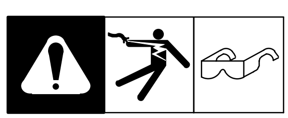
E. DC Open-Circuit Voltage, Voltage Control R2 At Maximum



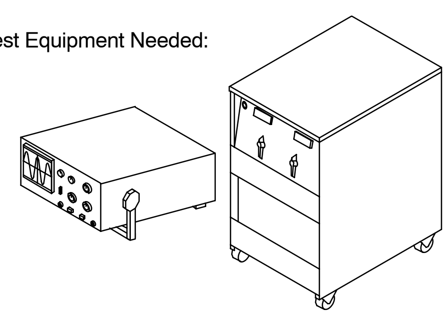
F. 29.4 Volts DC, Voltage Control R2 At Maximum (Resistive Load)



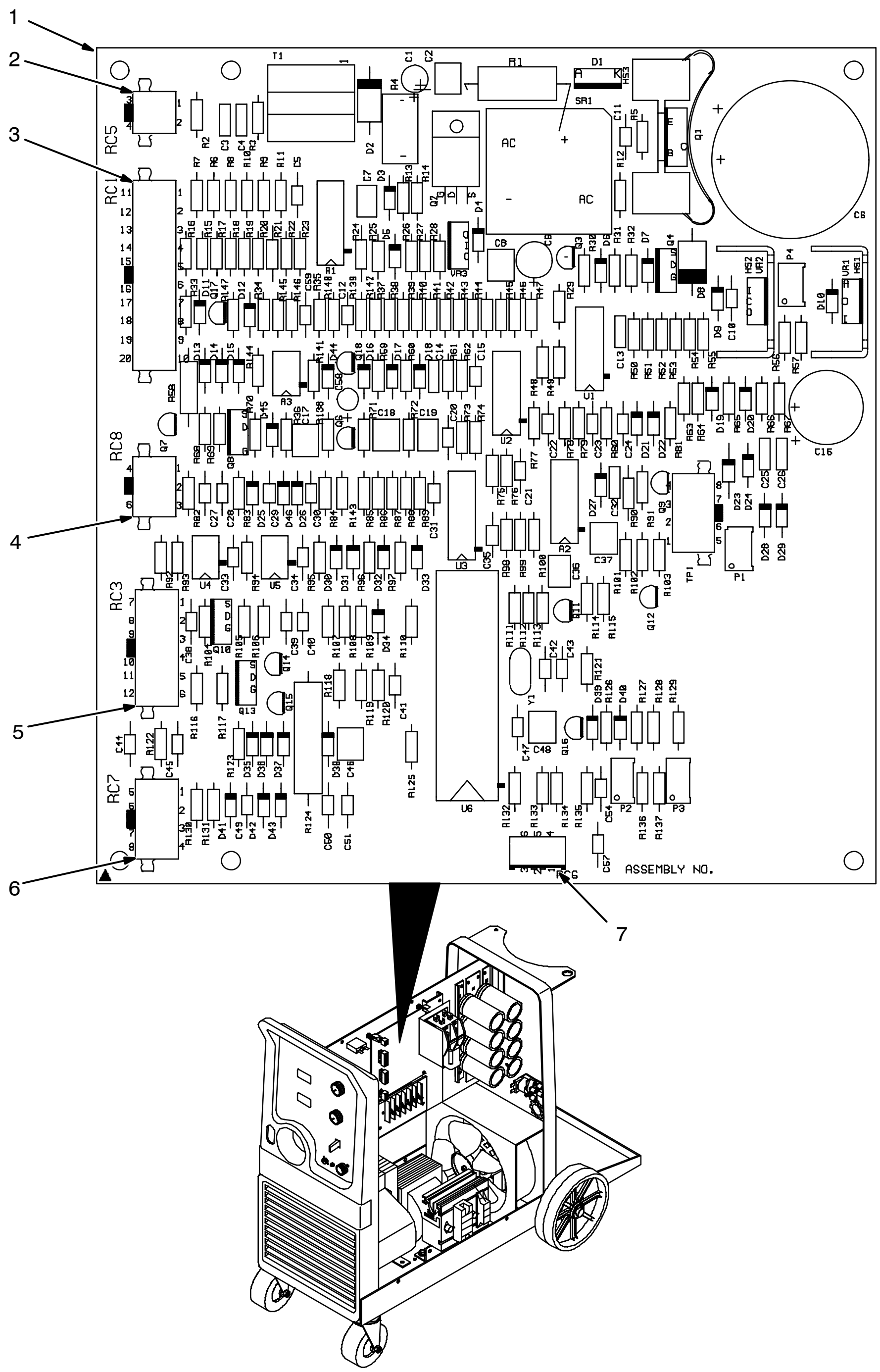
G1. SCR Gate Pulses With Respect To Cathode At No Load



Test Equipment Needed:



6-4. Main Control Board PC1 Testing Information (Use With Section 6-5)

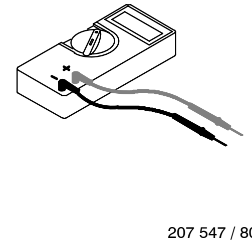


Be sure plugs are secure before testing. See Section 6-5 for specific values during testing.

1 Main Control Board PC1
2 Receptacle RC5
3 Receptacle RC1
4 Receptacle RC8
5 Receptacle RC3
6 Receptacle RC7
7 Receptacle RC6

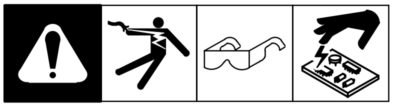
Factory use only

Test Equipment Needed:



207 547 / 803 046

6-5. Main Control Board PC1 Test Point Values



PC1 Voltage Readings

a) Tolerance – ±10% unless specified

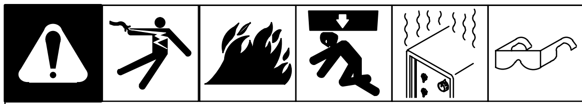
b) Reference – to circuit common (lead 1) unless noted

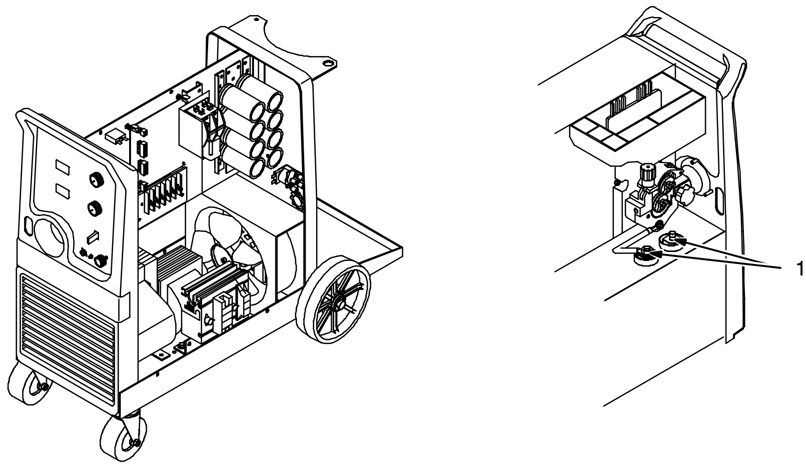
c) Triggered – means gun trigger is pressed

Receptacle	Pin	Values
RC5	1	Gate pulse to SCR with respect to pin RC2-4 (see Section 6-3)
	2	Gate pulse to SCR with respect to pin RC2-3 (see Section 6-3)
	3	Reference for gate pulse to SCR
	4	Reference for gate pulse to SCR
RC1	1	+35 volts dc for start contactor
	2	24 volts ac with respect to RC1-15 or RC1-13
	3	+5 volts dc for current detect with respect to RC1-4 common when off
	4	Current detect enable
	5	Voltage feedback common
	6	Voltage feedback +14 to +38 volts dc
	7	Thermistor input +1.5 to 4.0 volts dc normal
	8	Start contactor enable
	9	Gas valve +35 volts dc
	10	Gas valve enable
	11	24 volts ac with respect to RC1-13 or RC1-15
	12	Common for thermistor
	13	24 volts ac common
	14	Positive weld output stud voltage feedback with respect to RC1-5
	15	24 volts ac common
	16	Fan relay +24 volts dc
	17	Not used
	18	Fan relay enable
	19	Drive motor negative
	20	Drive motor positive +6 to 24 volts dc ±3 volts ac with respect to RC1-20
RC8	1	+35 volts dc to meter board
	2	Serial communication to meter board
	3	Serial communication to meter board
	4	Meter board common
	5	Not used
	6	Not used

Receptacle	Pin	Values
RC3	1	Spool gun potentiometer reference output +5 volts dc
	2	Spool gun trigger input +35 volts dc when off
	3	MIG trigger input common
	4	Spool gun motor negative (−)
	5	MIG trigger input +35 volts dc when off
	6	24 volts ac with respect to RC3-11
	7	Not used
	8	Spool gun trigger common
	9	Spool gun potentiometer common
	10	Spool gun potentiometer wiper 0 to +5 volts dc min to max
	11	24 volts ac with respect to RC3-6
	12	Spool gun motor positive (+)
RC7	1	Voltage command input 0 to +5 volts dc
	2	Wire feed speed command input 0 to +5 volts dc
	3	Wire feed speed potentiometer common
	4	Voltage potentiometer common
	5	Voltage potentiometer reference +5 volts dc
	6	Wire feed speed potentiometer reference +5 volts dc
	7	Not used
	8	Not used

6-6. Pre-Operational Check





1 Weld Output Terminals

Check open-circuit voltage between terminals according to Section 6-2 (voltage V11).

☞ *Also use output waveforms to check unit output after servicing (see Section 6-3).*

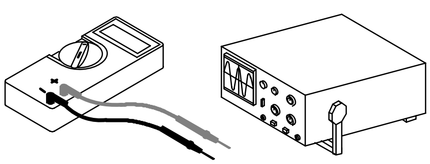
If correct voltages are not present, repeat troubleshooting procedures in Section 6-1.

▲ **Disconnect input power and let unit cool.**

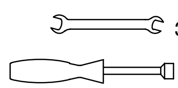
Complete pre-operational checks in table. Reinstall wrapper, side panel, and door.

✓	Pre-Operational Checklist	
	Clean and blow out inside of unit.	✓
	Clean weld output terminals. Tighten connections.	✓
	Check labels; replace labels that are unreadable or damaged (see Parts List).	✓
	Clean outside of entire unit.	✓

Test Equipment Needed:



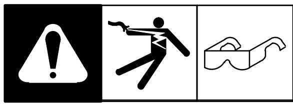
Tools Needed:

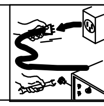


803 046 / Ref. 802 474-E

SECTION 7 – MAINTENANCE

7-1. Routine Maintenance



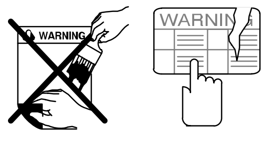


▲ **Disconnect power before maintaining.**

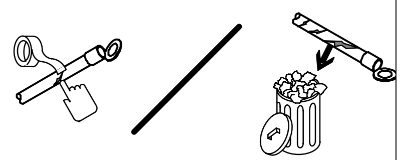
☞ *Maintain more often during severe conditions.*

3 Months

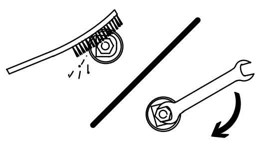
Replace unreadable labels



Repair or replace cracked weld cable

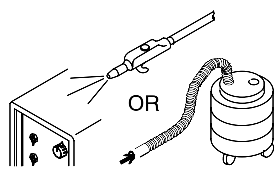


Clean and tighten weld terminals

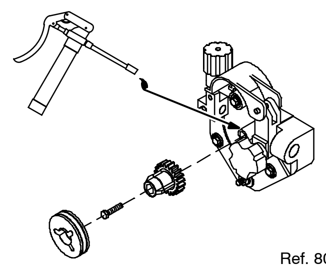


6 Months

Blow out or vacuum inside.



Remove drive roll and carrier. Apply light coat of oil or grease to drive motor shaft.

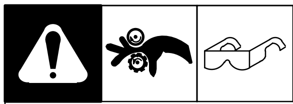


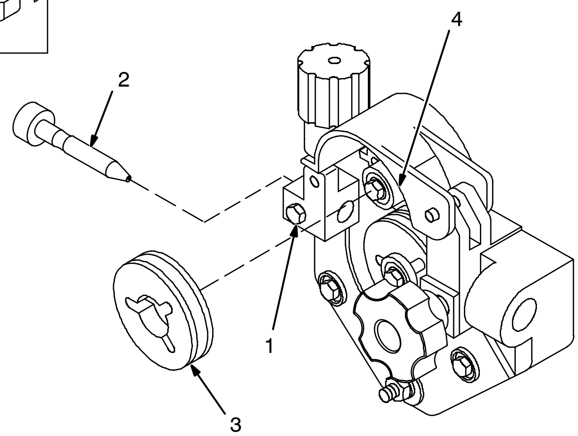
Ref. 802 990

7-2. Unit Overload

Thermistor T in SCR1 protects the unit from damage due to overheating. If HL.P 002 is displayed on the meters, wait for unit to cool allowing fan motor to run before trying to weld. If unit is cool and no weld output continues, contact Factory Authorized Service Agent.

7-3. Changing Drive Roll and Wire Inlet Guide





1 Securing Screw
2 Inlet Wire Guide

Loosen screw. Slide tip as close to drive rolls as possible without touching. Tighten screw.

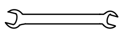
3 Drive Roll

The drive roll consists of two different sized grooves. The stamped markings on the end surface of the drive roll refers to the groove on the opposite side of the drive roll. The groove closest to the motor shaft is the proper groove to thread (see Section 3-13).

4 Drive Roll Securing Nut

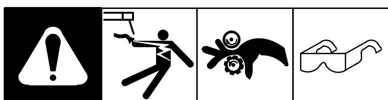
Turn nut one click to secure drive roll.

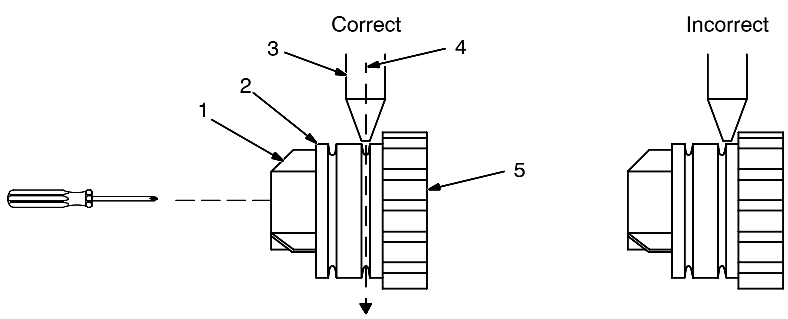
Tools Needed:

 7/16 in

Ref. 802 990-A

7-4. Aligning Drive Rolls and Wire Guide





▲ **Turn Off power.**

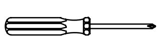
View is from top of drive rolls looking down with pressure assembly open.

1 Drive Roll Securing Nut
2 Drive Roll
3 Wire Guide
4 Welding Wire
5 Drive Gear

Insert screwdriver, and turn screw in or out until drive roll groove lines up with wire guide.

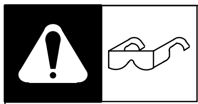
Close pressure roll assembly.

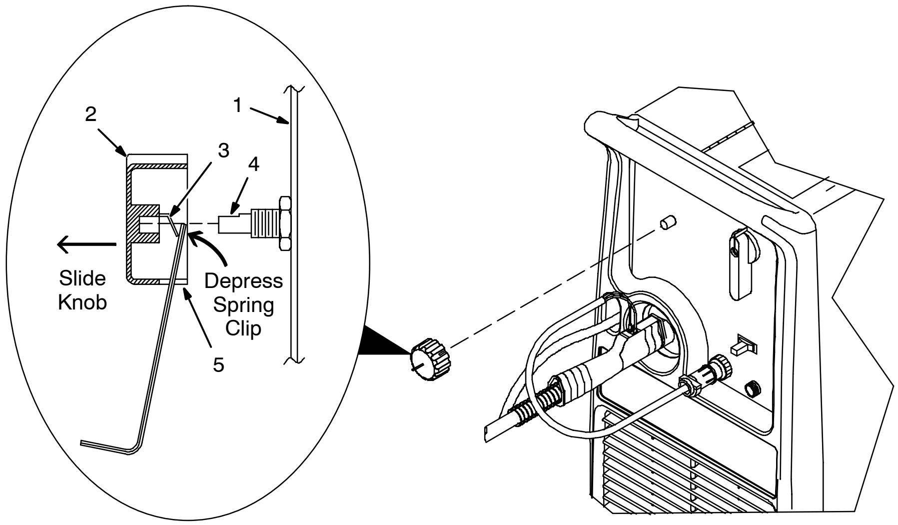
Tools Needed:



Ref. 800 412-A

7-5. Removing Knob From Front Panel





▲ **Turn Off power.**

1 Front Panel
2 Knob
3 Spring Clip
4 Control Shaft
5 Slot

Rotate knob to allow access to slot. Insert Allen wrench (or stiff piece of wire) into slot, and while depressing spring clip, slide knob off control shaft.

To reinstall, push knob fully onto control shaft.

Ref. 803 346 / Ref. 803 863-B

SECTION 8 – ELECTRICAL DIAGRAMS

☞ *The circuits in this manual can be used for troubleshooting, but there might be minor circuit differences from your machine. Use circuit inside machine case or contact distributor for more information.*

The following is a list of all diagrams for models covered by this manual.

Model	Serial Or Style Number	Circuit Diagram	Wiring Diagram
Millermatic 251	LB170597 thru LC507658	204 321-E	200 527-C♦♦
	LC507659 thru LF430260B	211 406-C	211 407-C
	LF430261B and following	226 707-A	226 709-A♦♦
Circuit Board PC1	LB170597 thru LC141472	203 427♦♦	♦♦
	LC141473 thru LE152375	207 548	♦♦
	LE152376 and following	212 363-A	♦♦
Circuit Board PC2	LB170597 thru LC324875	199 749♦♦	♦♦
	LC324876 thru LF390238B	210 604	♦♦
	LF390239B and following	224 080-B	♦♦

♦♦ Not included in this manual

⚠ WARNING	• Do not touch live electrical parts.
ELECTRIC SHOCK HAZARD	• Disconnect input power or stop engine before servicing. • Do not operate with covers removed. • Have only qualified persons install, use, or service this unit.

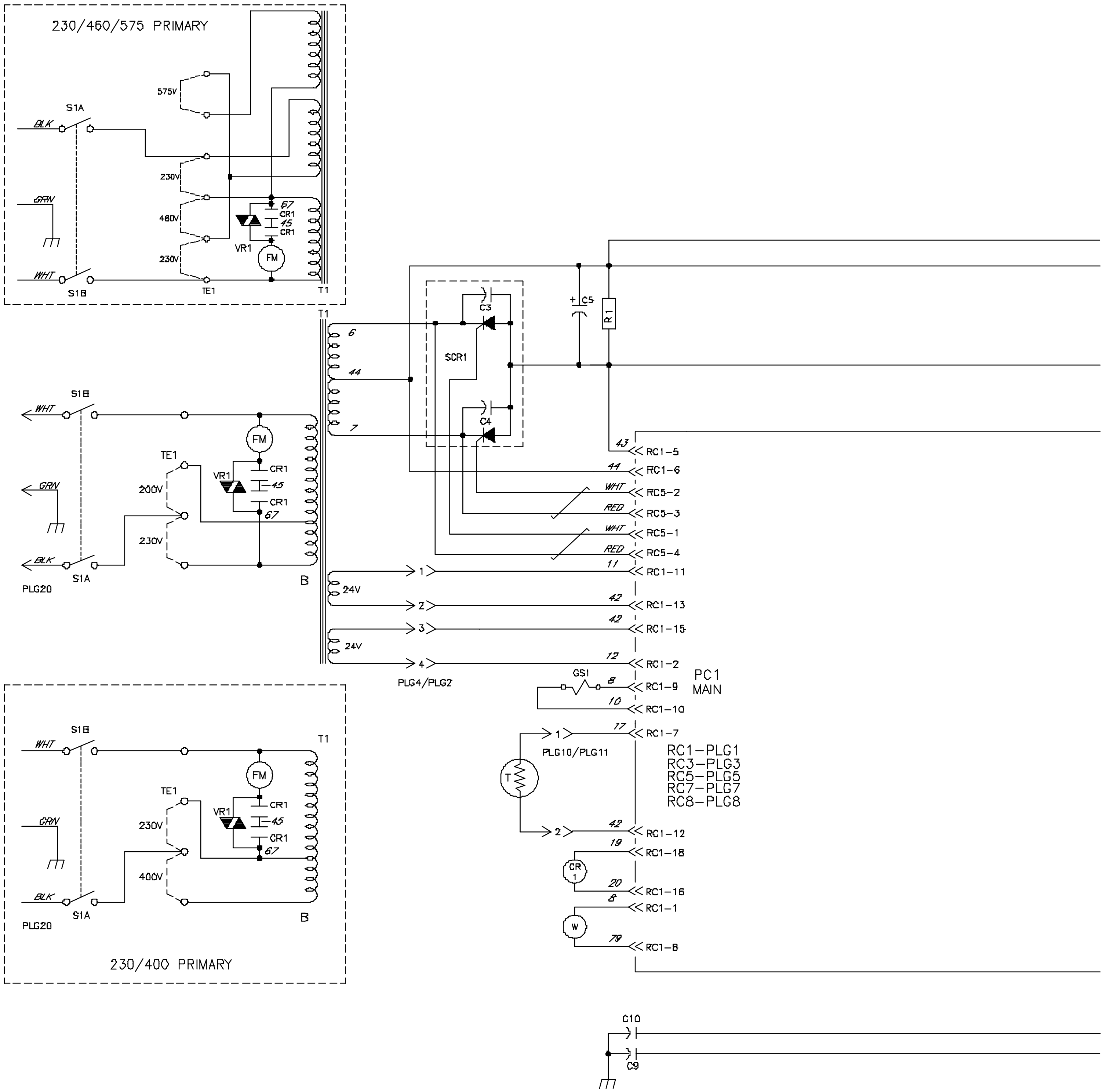
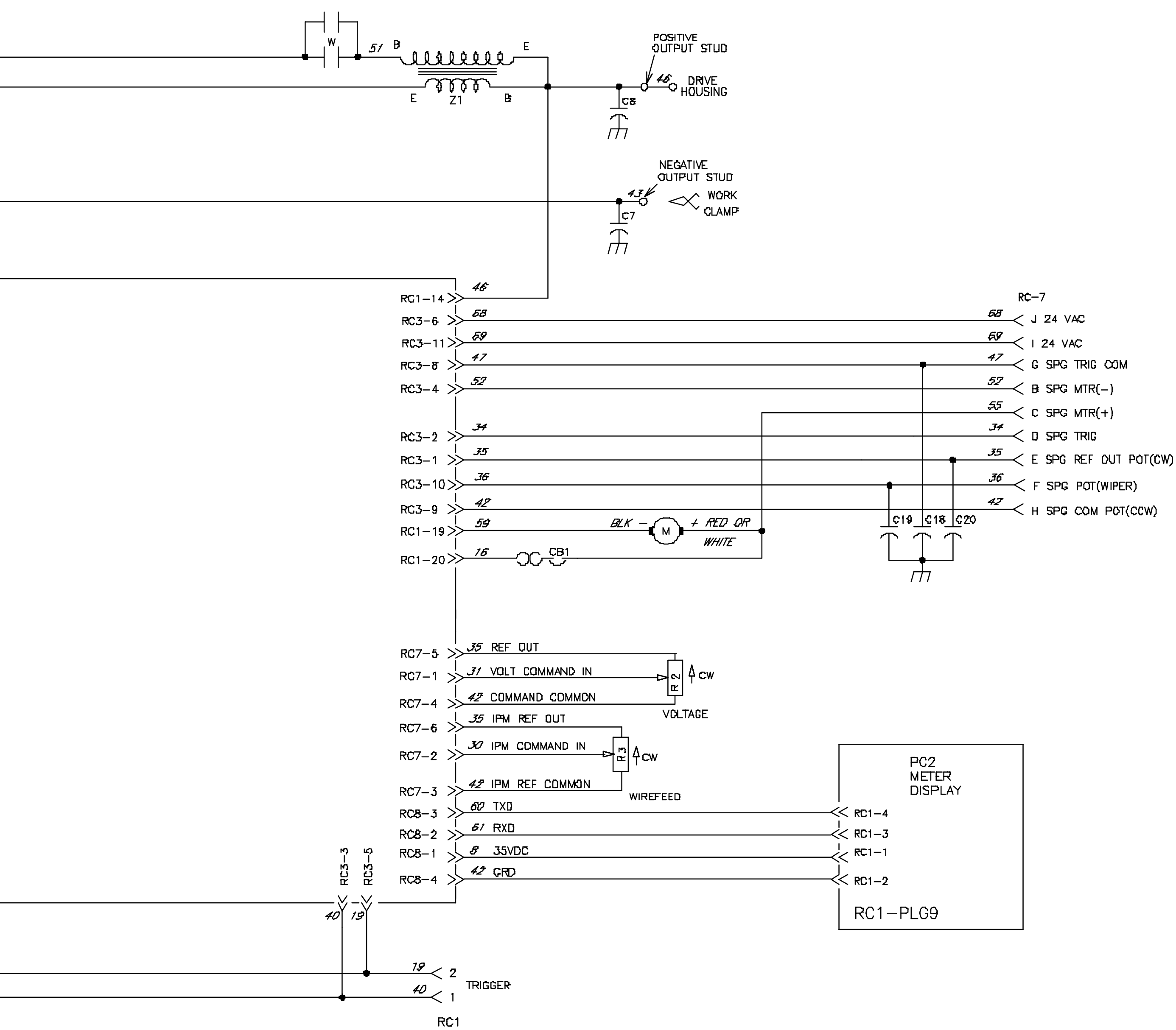


Figure 8-1. Circuit Diagram For Millermatic 251 Eff w/LB170597 Thru LC507658



W
51
B
E
Z1
POSITIVE OUTPUT STUD
46
DRIVE HOUSING
C8
NEGATIVE OUTPUT STUD
43
WORK CLAMP
C7
RC1-14
RC3-6
RC3-11
RC3-8
RC3-4
RC3-2
RC3-1
RC3-10
RC3-9
RC1-19
RC1-20
RC-7
J 24 VAC
I 24 VAC
G SPG TRIG COM
B SPG MTR(-)
C SPG MTR(+)
D SPG TRIG
E SPG REF OUT POT(CW)
F SPG POT(WIPER)
H SPG COM POT(CCW)
BLK -
+ RED OR WHITE
M
CB1
C19
C18
C20
RC7-5
RC7-1
RC7-4
RC7-6
RC7-2
RC7-3
35 REF OUT
31 VOLT COMMAND IN
42 COMMAND COMMON
R2
CW
VOLTAGE
35 IPM REF OUT
30 IPM COMMAND IN
42 IPM REF COMMON
R3
WIREFEED
RC8-3
RC8-2
RC8-1
RC8-4
60 TXD
61 RXD
8 35VDC
42 GRD
PC2
METER
DISPLAY
RC1-4
RC1-3
RC1-1
RC1-2
RC1-PLG9
RC3-3
RC3-5
40
19
2
1
TRIGGER
RC1

204 321-E

⚠ WARNING	
ELECTRIC SHOCK HAZARD	• Do not touch live electrical parts. • Disconnect input power or stop engine before servicing. • Do not operate with covers removed. • Have only qualified persons install, use, or service this unit.

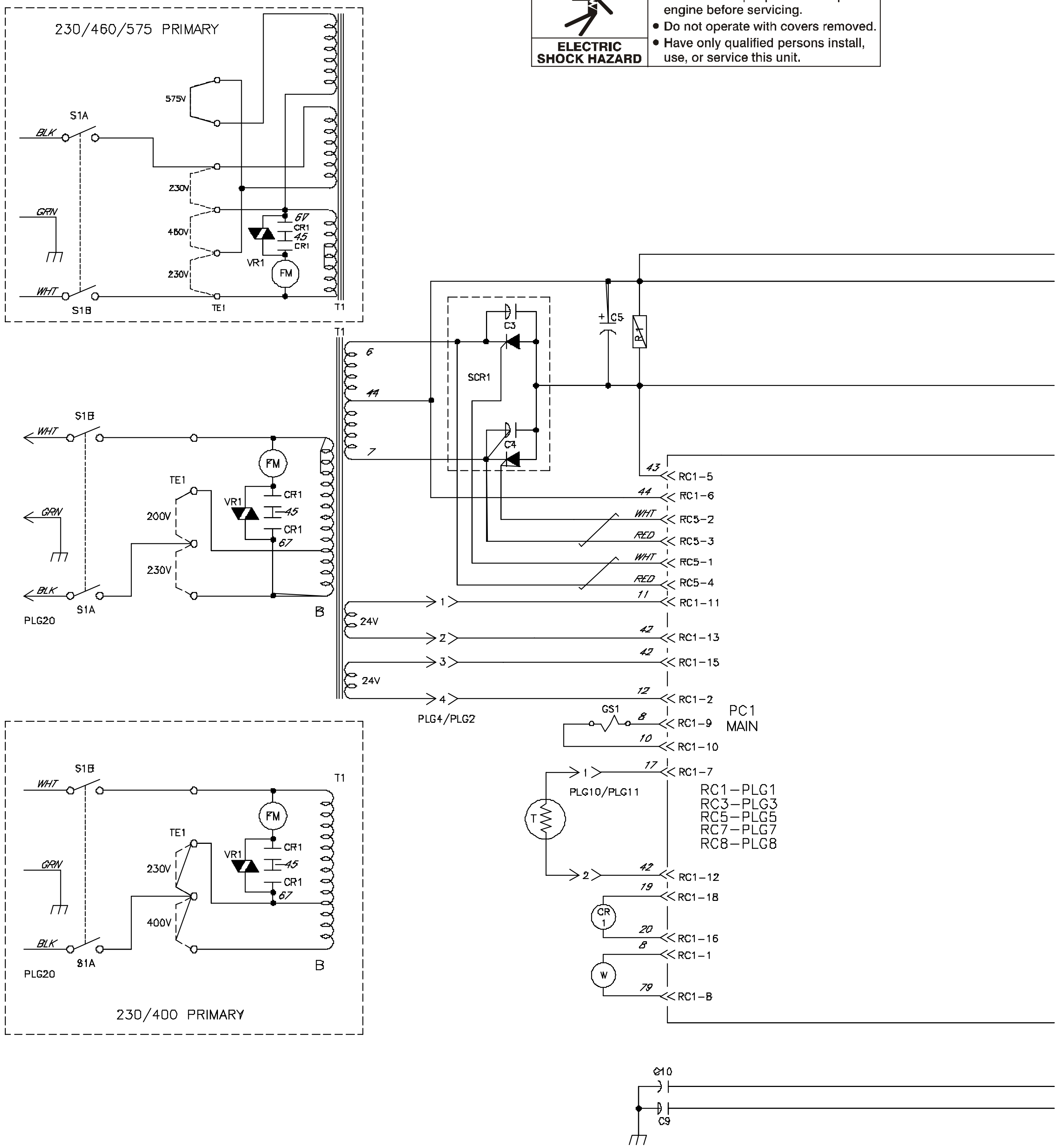
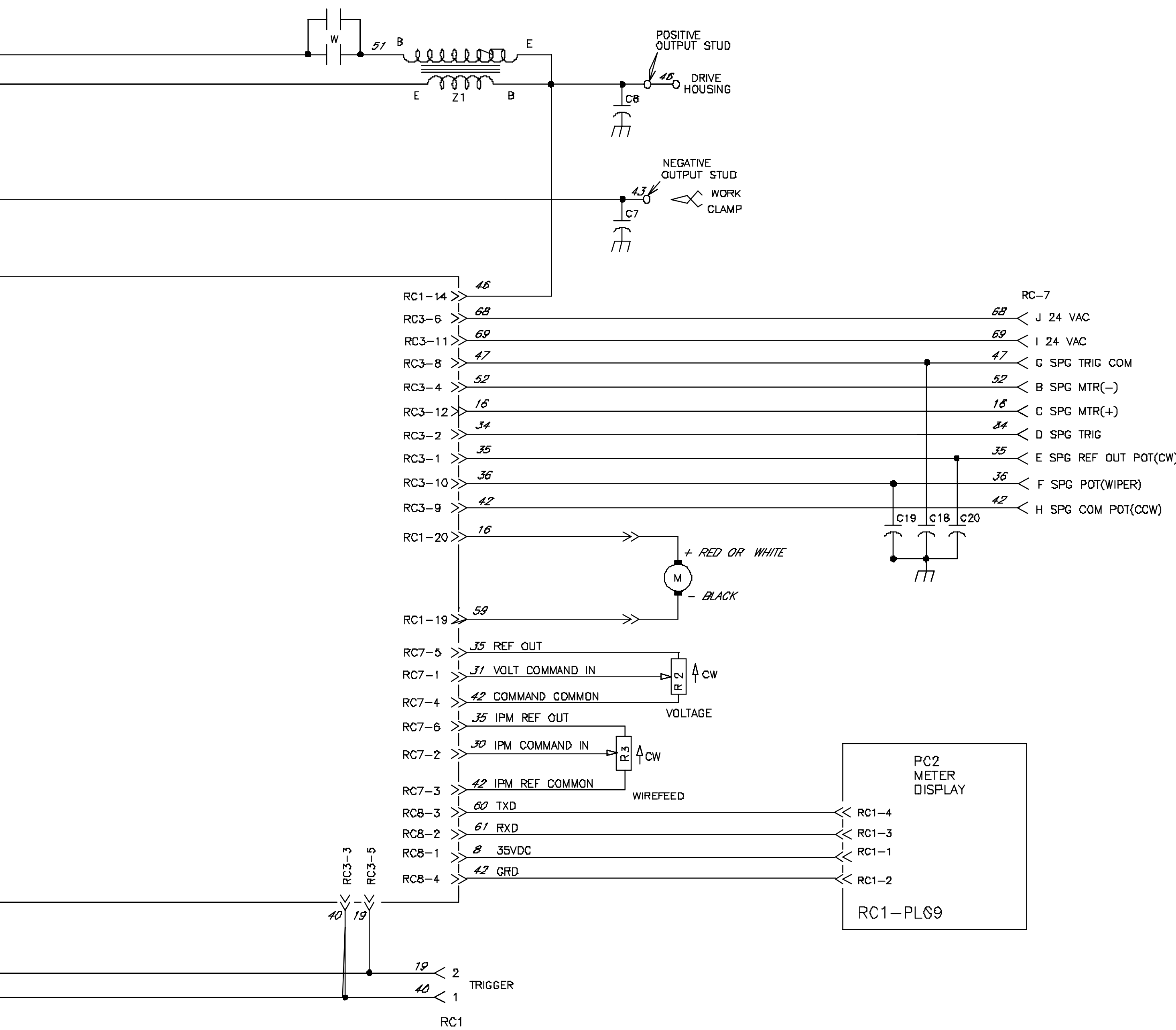
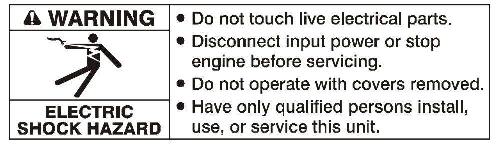


Figure 8-2. Circuit Diagram For Millermatic 251 Eff w/LB170597 Thru LF430260B



W
51
B
E
Z1
POSITIVE OUTPUT STUD
46
DRIVE HOUSING
C8
NEGATIVE OUTPUT STUD
43
WORK CLAMP
C7
RC1-14
RC3-6
RC3-11
RC3-8
RC3-4
RC3-12
RC3-2
RC3-1
RC3-10
RC3-9
RC1-20
RC1-19
RC7-5
RC7-1
RC7-4
RC7-6
RC7-2
RC7-3
RC8-3
RC8-2
RC8-1
RC8-4
RC-7
J 24 VAC
I 24 VAC
G SPG TRIG COM
B SPG MTR(−)
C SPG MTR(+)
D SPG TRIG
E SPG REF OUT POT(CW)
F SPG POT(WIPER)
H SPG COM POT(CCW)
C19
C18
C20
+ RED OR WHITE
M
− BLACK
35 REF OUT
31 VOLT COMMAND IN
42 COMMAND COMMON
R2
CW
VOLTAGE
35 IPM REF OUT
30 IPM COMMAND IN
42 IPM REF COMMON
R3
CW
WIREFEED
60 TXD
61 RXD
8 35VDC
42 GRD
PC2 METER DISPLAY
RC1-4
RC1-3
RC1-1
RC1-2
RC1-PLG9
RC3-3
RC3-5
40
19
TRIGGER
2
1
RC1

211 406-C



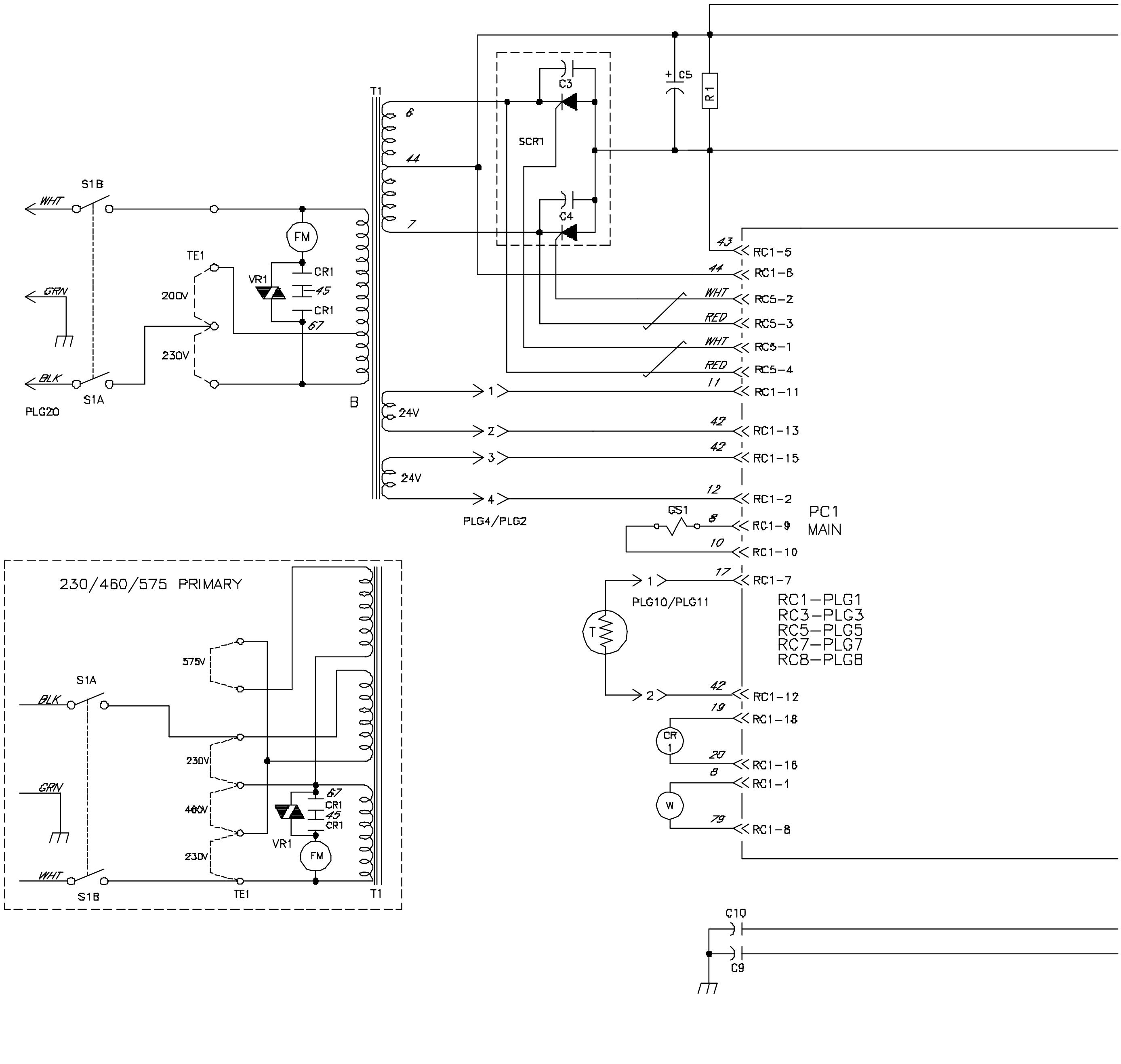
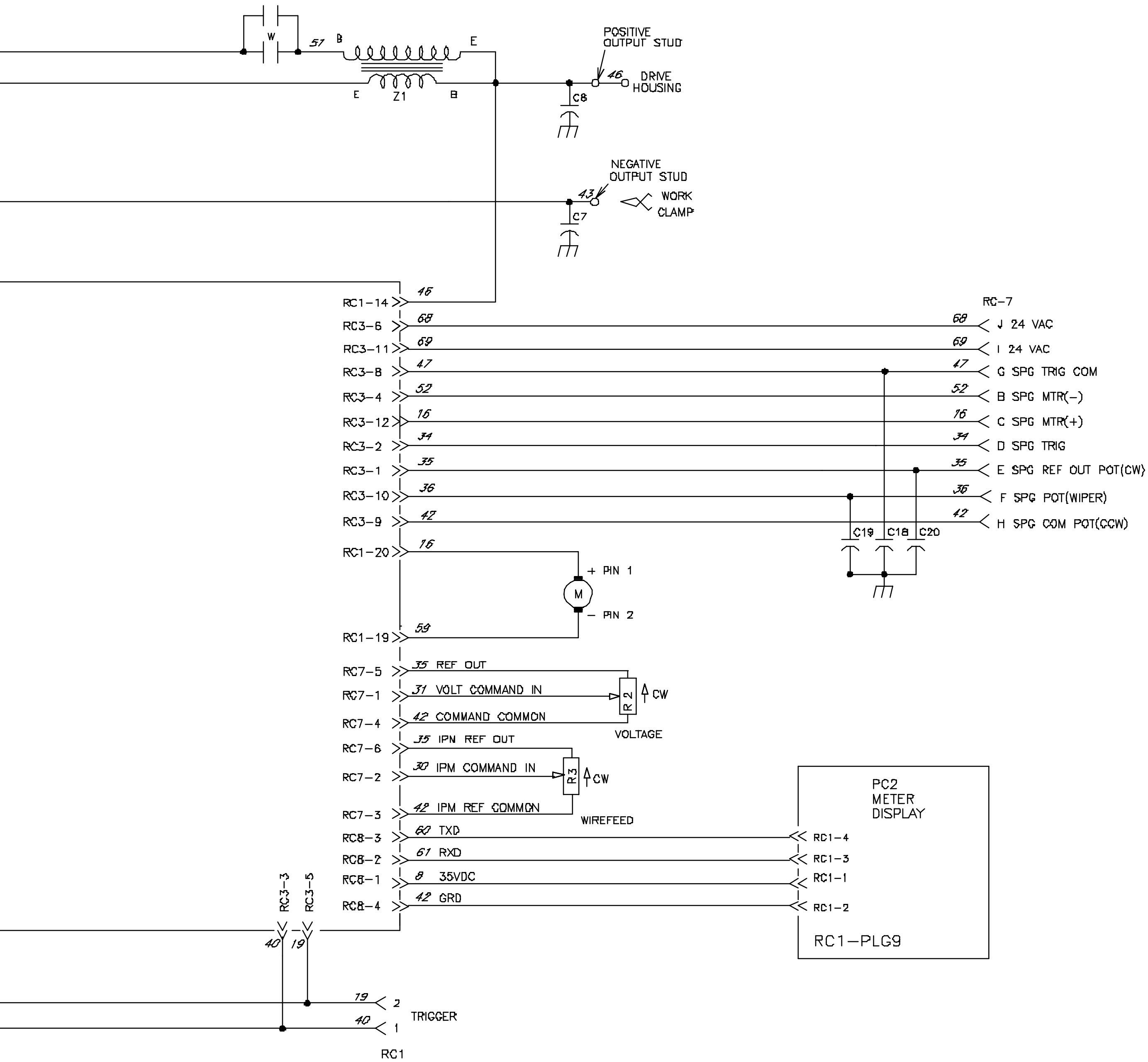


Figure 8-3. Circuit Diagram For Millermatic 251 Eff w/LF430261B And Following


W
57
B
E
Z1
POSITIVE OUTPUT STUD
46
DRIVE HOUSING
C8
NEGATIVE OUTPUT STUD
43
WORK CLAMP
C7
RC1-14
RC3-6
RC3-11
RC3-8
RC3-4
RC3-12
RC3-2
RC3-1
RC3-10
RC3-9
RC1-20
RC1-19
RC-7
J 24 VAC
I 24 VAC
G SPG TRIG COM
B SPG MTR(−)
C SPG MTR(+)
D SPG TRIG
E SPG REF OUT POT(CW)
F SPG POT(WIPER)
H SPG COM POT(CCW)
C19
C18
C20
M
+ PIN 1
− PIN 2
RC7-5
RC7-1
RC7-4
35 REF OUT
31 VOLT COMMAND IN
42 COMMAND COMMON
R2
CW
VOLTAGE
RC7-6
RC7-2
RC7-3
35 IPN REF OUT
30 IPM COMMAND IN
42 IPM REF COMMON
R3
CW
WIREFEED
RC8-3
RC8-2
RC8-1
RC8-4
60 TXD
61 RXD
8 35VDC
42 GRD
PC2 METER DISPLAY
RC1-4
RC1-3
RC1-1
RC1-2
RC1-PLG9
RC3-3
RC3-5
40
19
TRIGGER
RC1

226 707-A

⚠ WARNING	• Do not touch live electrical parts.
ELECTRIC SHOCK HAZARD	• Disconnect input power or stop engine before servicing. • Do not operate with covers removed. • Have only qualified persons install, use, or service this unit.

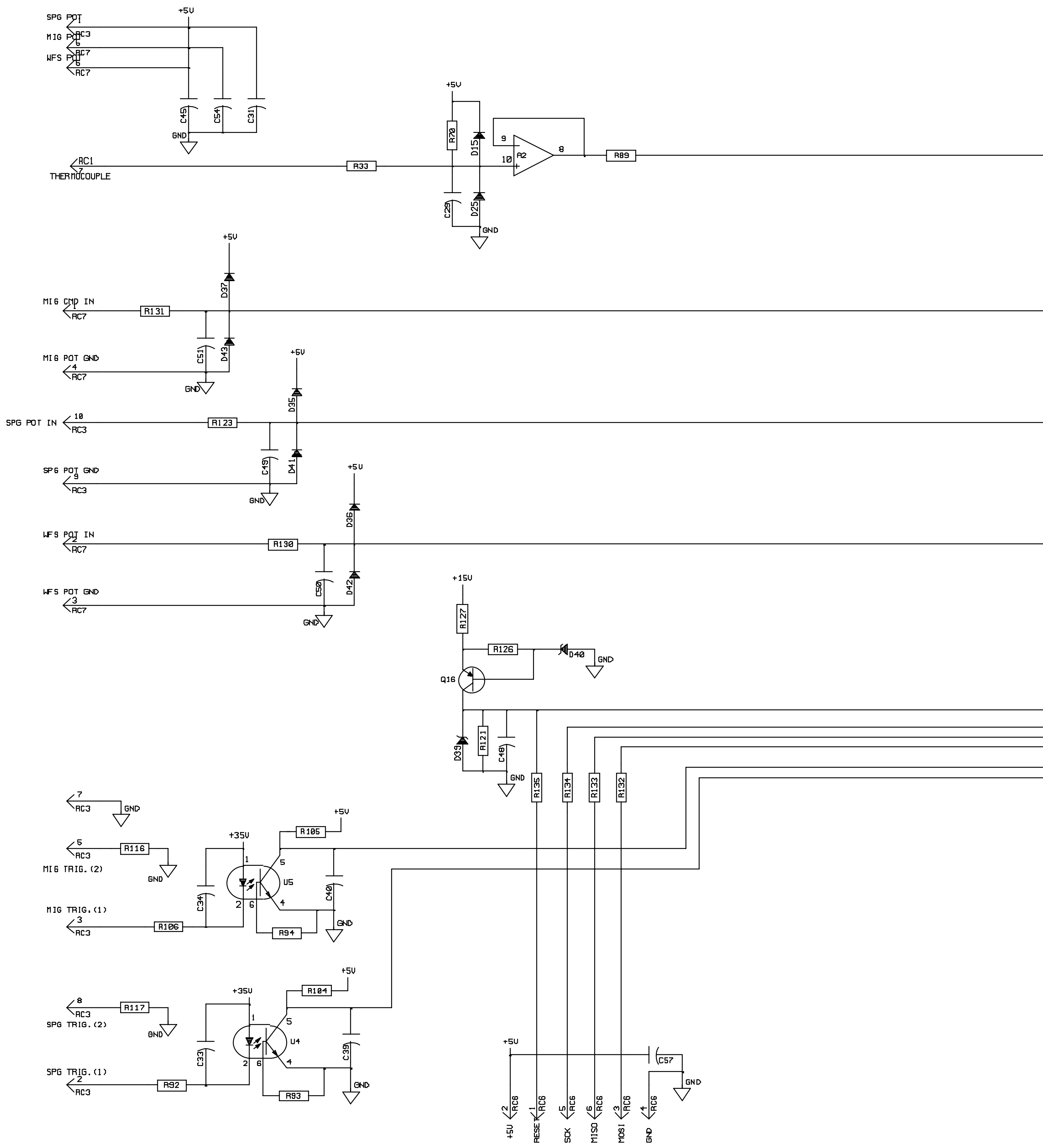
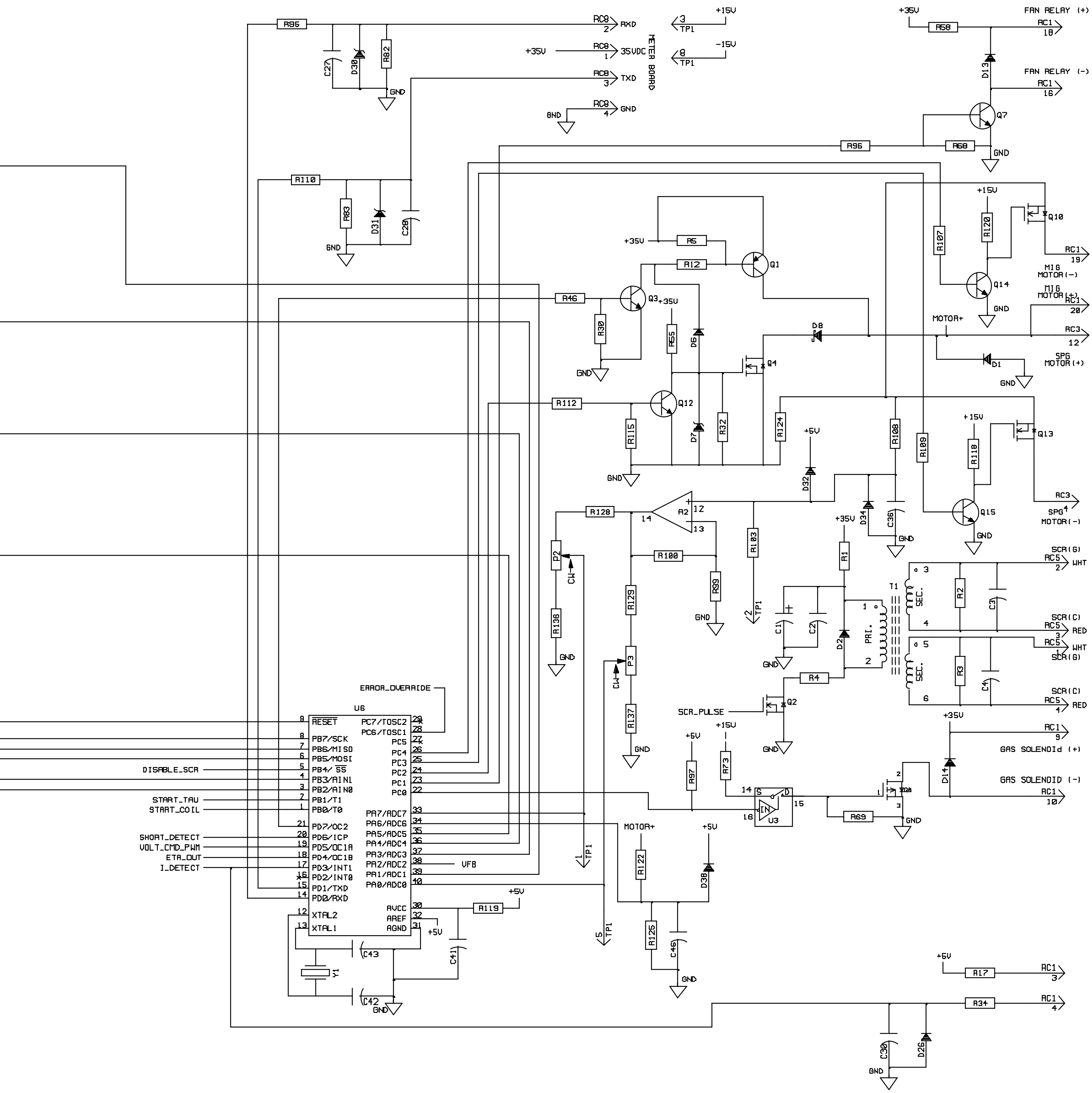


Figure 8-4. Circuit Diagram For Main Control Board PC1 Eff w/LC141473 Thru LE152375



Part 1 Of 2 207 548

⚠ WARNING	• Do not touch live electrical parts.
	• Disconnect input power or stop engine before servicing.
	• Do not operate with covers removed.
ELECTRIC SHOCK HAZARD	• Have only qualified persons install, use, or service this unit.

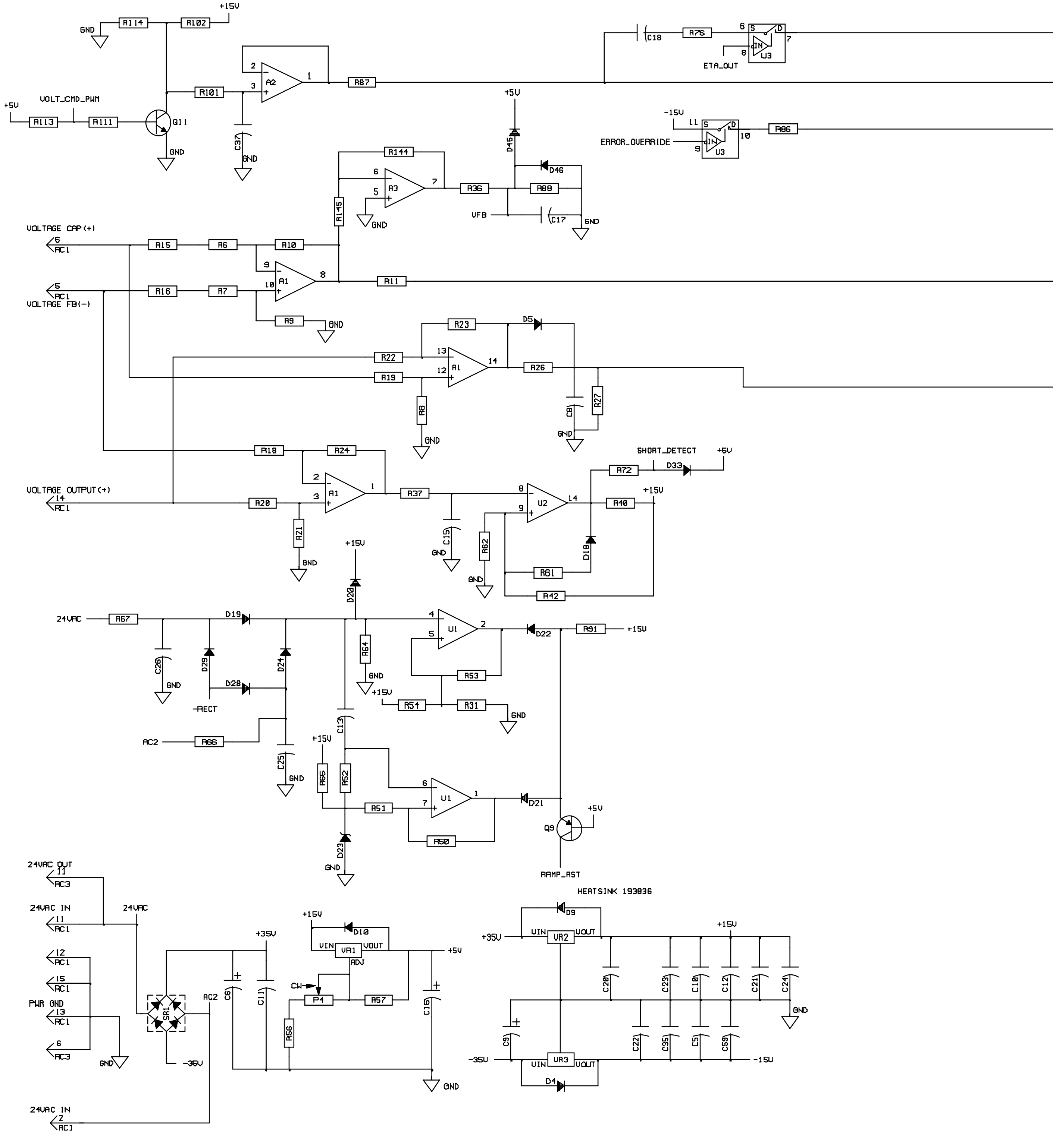
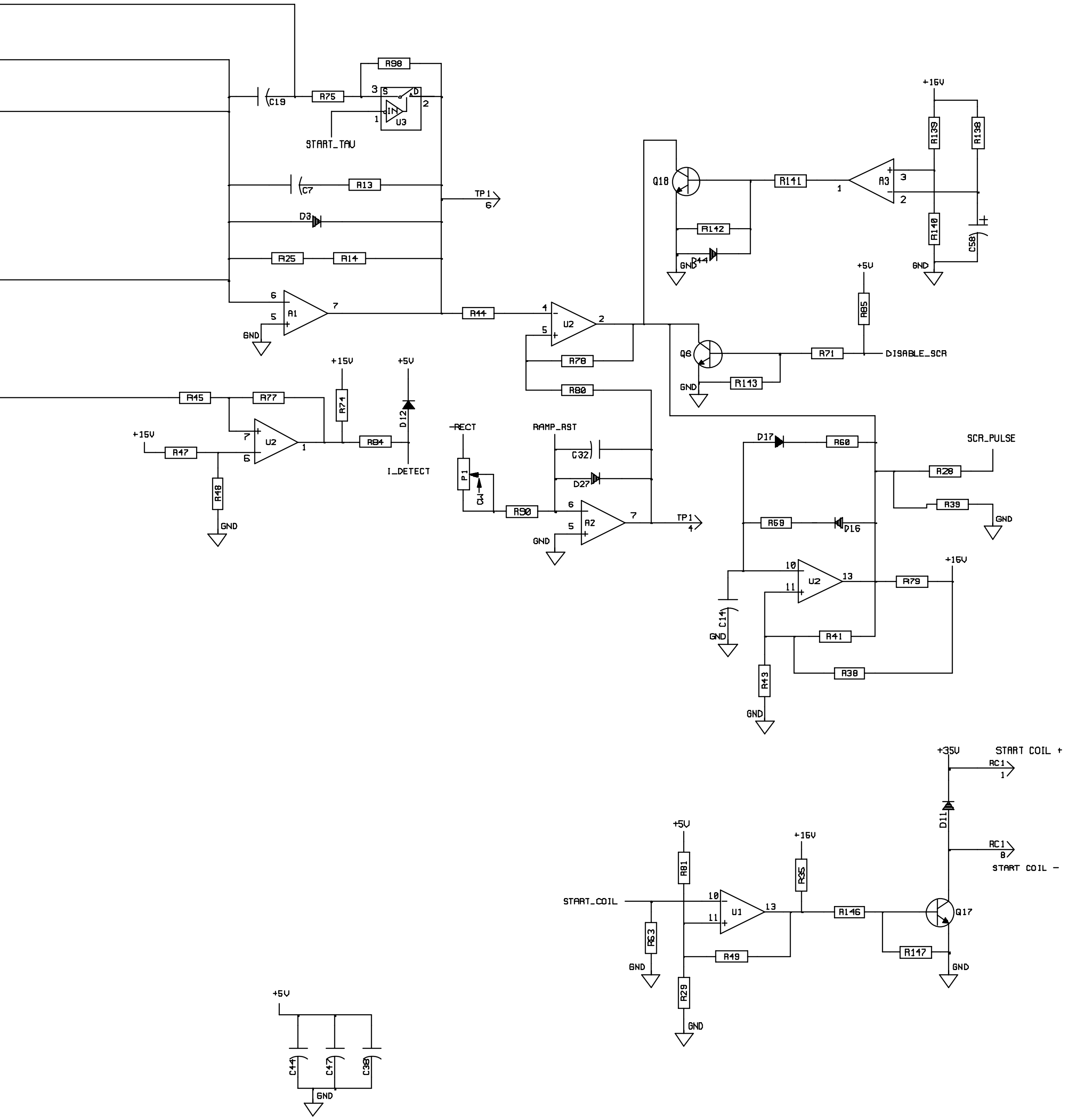


Figure 8-5. Circuit Diagram For Main Control Board PC1 Eff w/LC141473 Thru LE152375



POWER/GROUND NETS FOR CHIPS	
A1 A2	11=-15V 4=+15V
U1 U2	12=GND 3=+15V
U3	4,13=+15V 5=GND 12=+5V
U6	11=GND 10=+5V
A3	4=-15V 8=+15v
.	.

Part 2 Of 2 207 548

⚠ WARNING

ELECTRIC SHOCK HAZARD

- Do not touch live electrical parts.
- Disconnect input power or stop engine before servicing.
- Do not operate with covers removed.
- Have only qualified persons install, use, or service this unit.

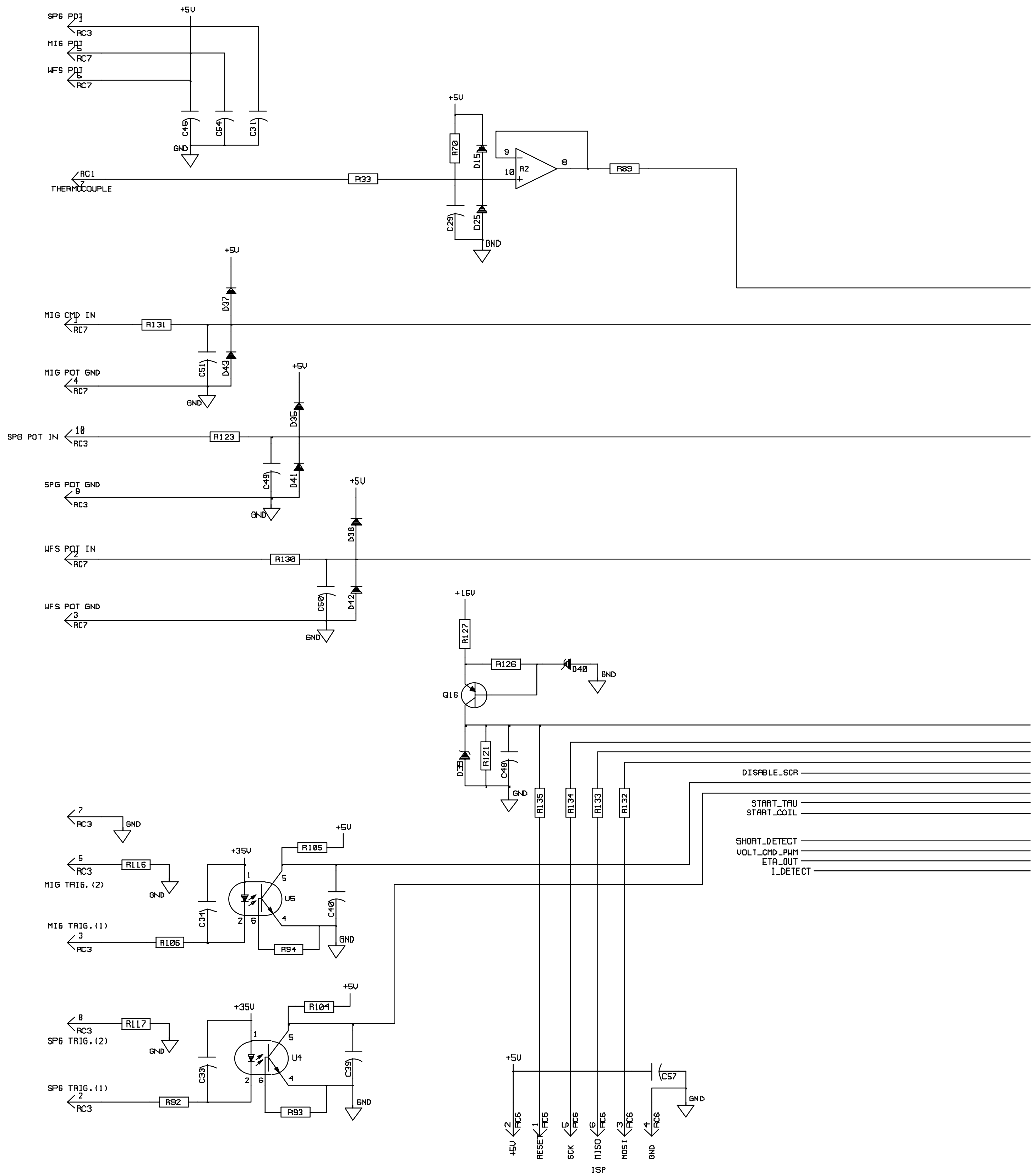
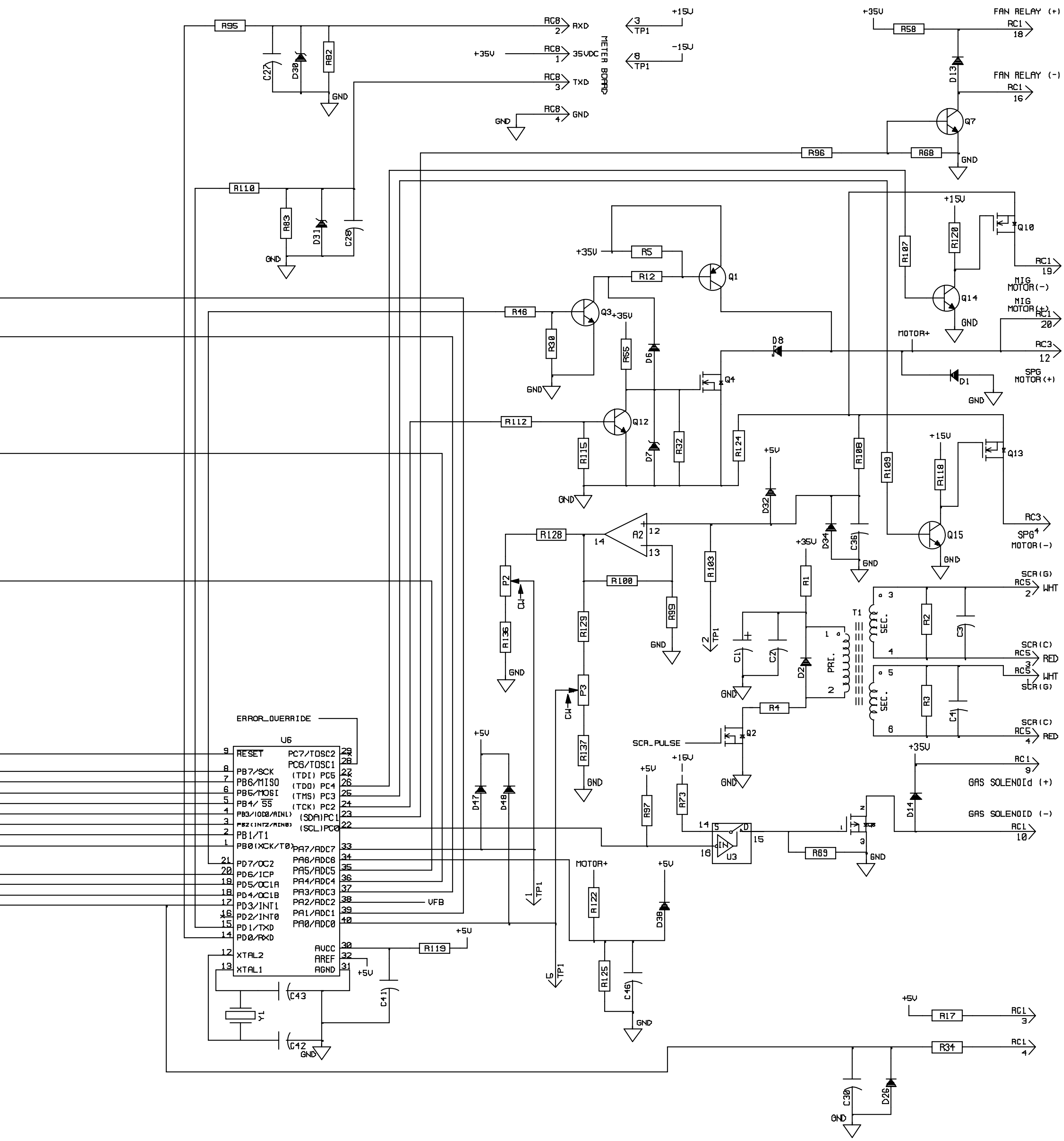


Figure 8-6. Circuit Diagram For Main Control Board PC1 Eff w/LE152376 And Following



Part 1 Of 2 212 363-A

⚠ WARNING	
ELECTRIC SHOCK HAZARD	• Do not touch live electrical parts. • Disconnect input power or stop engine before servicing. • Do not operate with covers removed. • Have only qualified persons install, use, or service this unit.

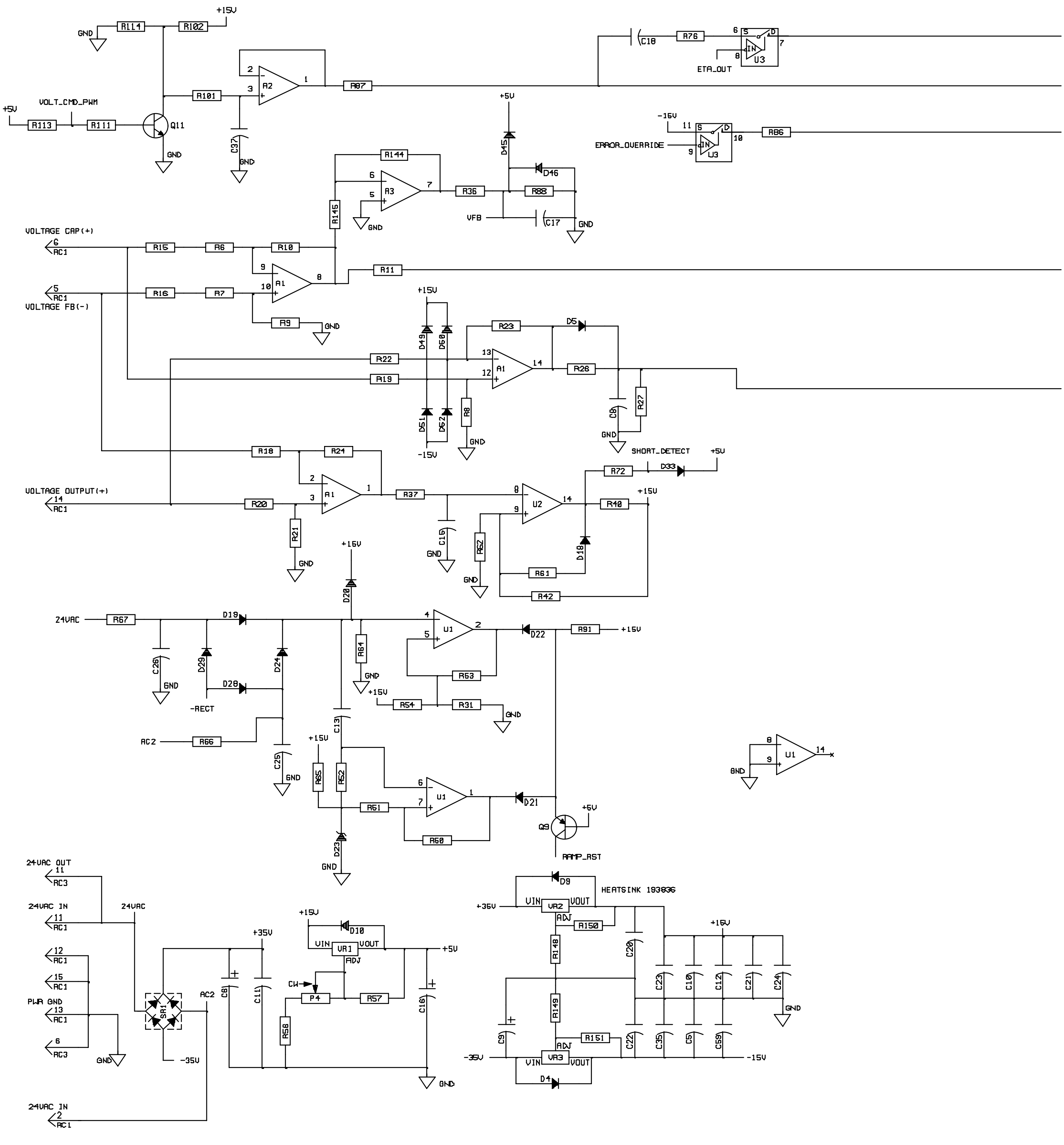
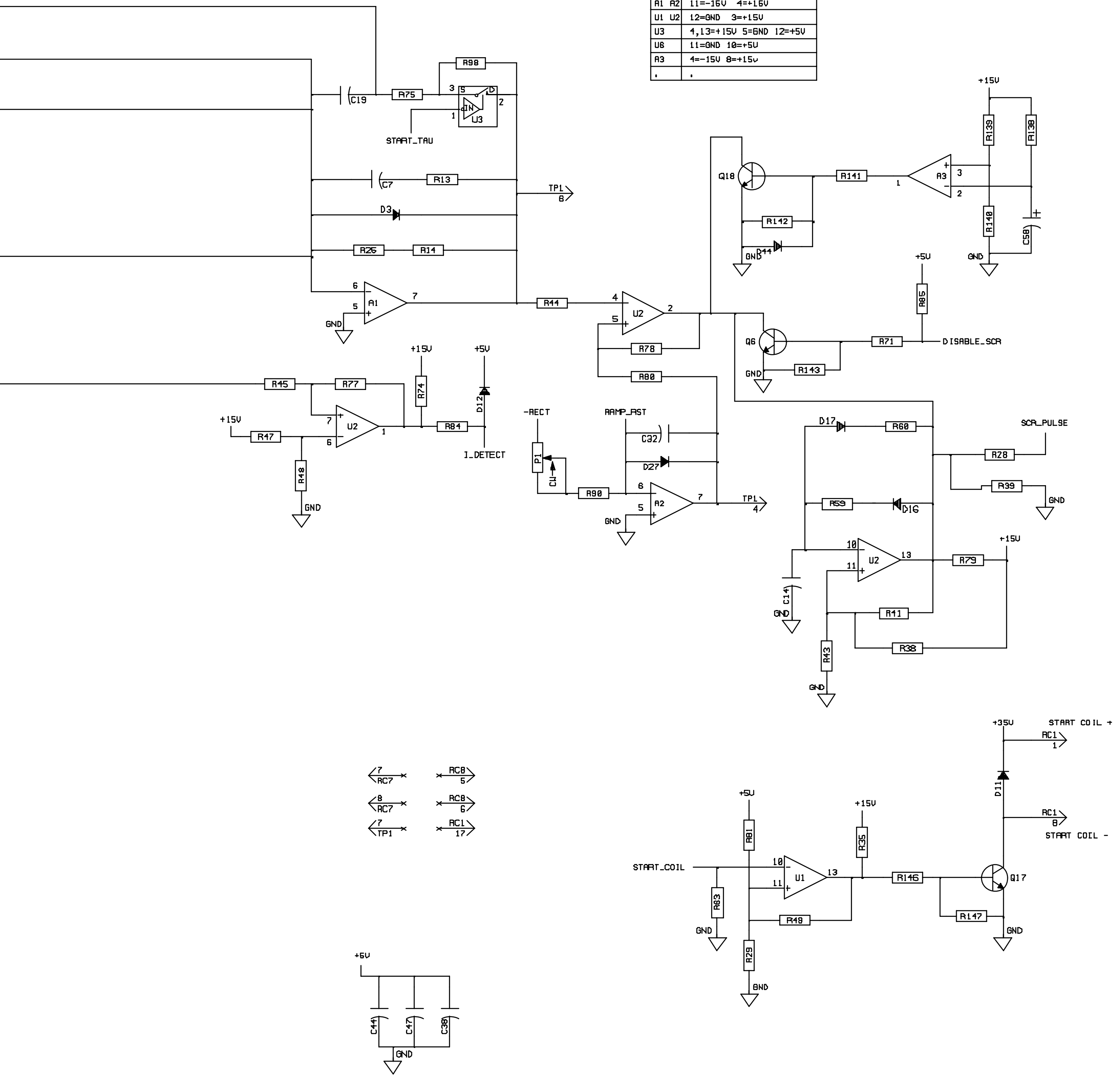


Figure 8-7. Circuit Diagram For Main Control Board PC1 Eff w/LE152376 And Following

POWER/GROUND NETS FOR CHIPS	
A1 A2	11=-16V 4=+16V
U1 U2	12=GND 3=+15V
U3	4,13=+15V 5=GND 12=+5V
U6	11=GND 10=+5V
A3	4=-15V 8=+15v
.	.

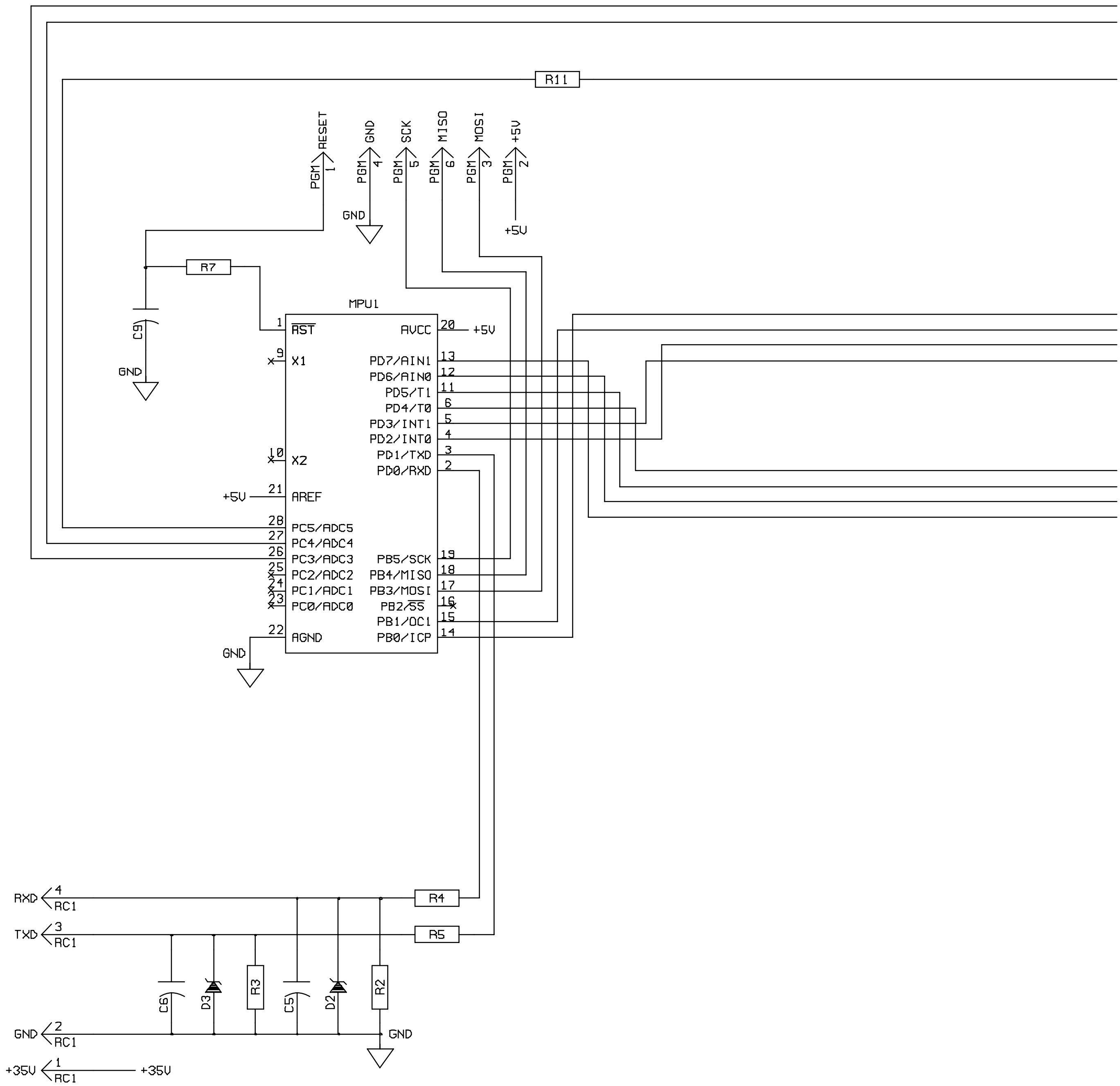


Part 2 Of 2 212 363-A

⚠ WARNING

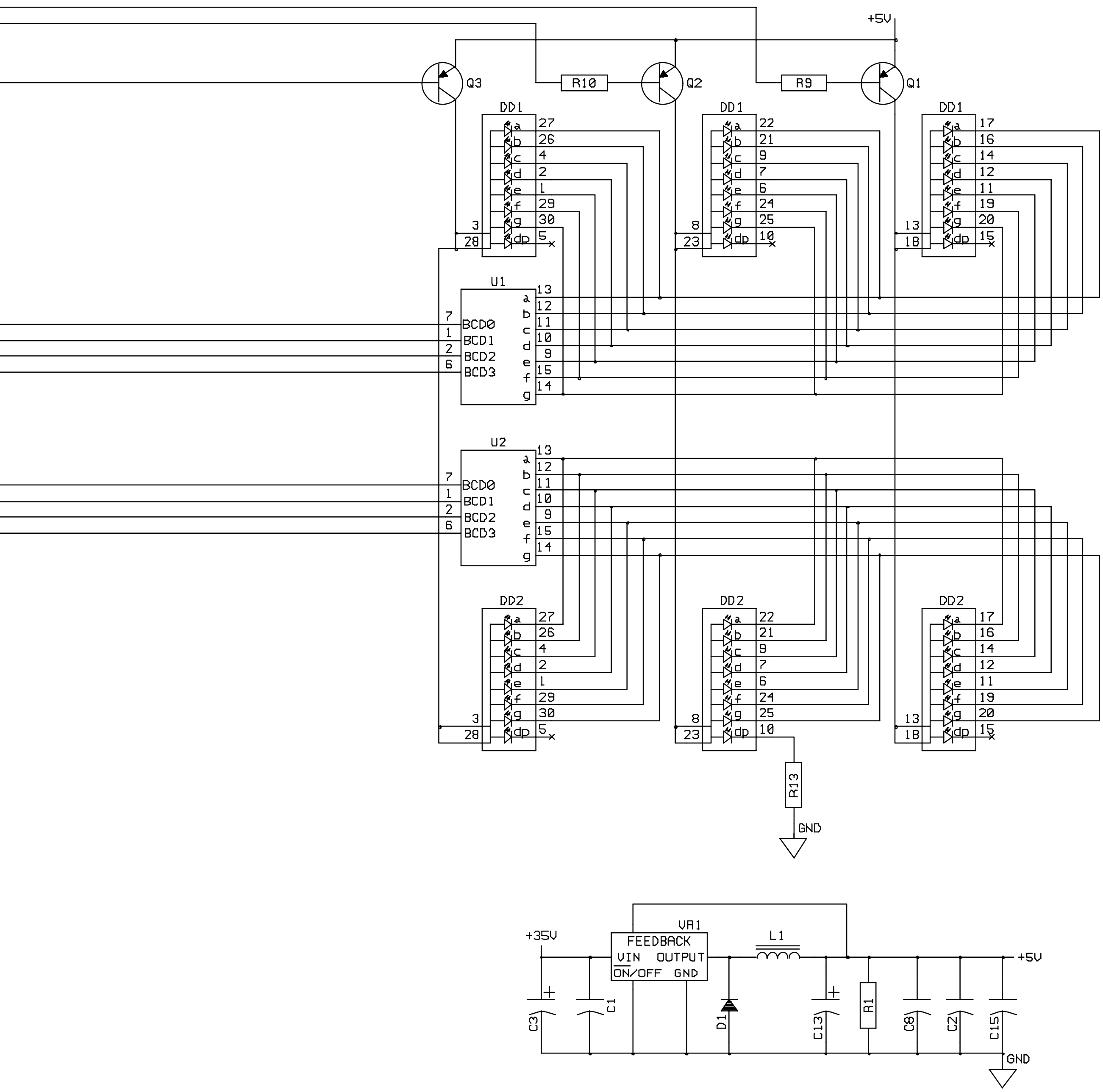
ELECTRIC SHOCK HAZARD

- Do not touch live electrical parts.
- Disconnect input power or stop engine before servicing.
- Do not operate with covers removed.
- Have only qualified persons install, use, or service this unit.



POWER/GROUND NETS FOR CHIPS	
U1	8=GND,16=+5V
U2	8=GND,16=+5V
MPU1	8=GND,7=+5V

Figure 8-8. Circuit Diagram For Meter Board PC2 Eff w/LC324876 Thru LF390239B



210 604

Figure 8-9. Circuit Diagram For Meter Board PC2 Eff w/LF390239B And Following

⚠ WARNING	• Do not touch live electrical parts.
	• Disconnect input power or stop engine before servicing.
	• Do not operate with covers removed.
ELECTRIC SHOCK HAZARD	• Have only qualified persons install, use, or service this unit.

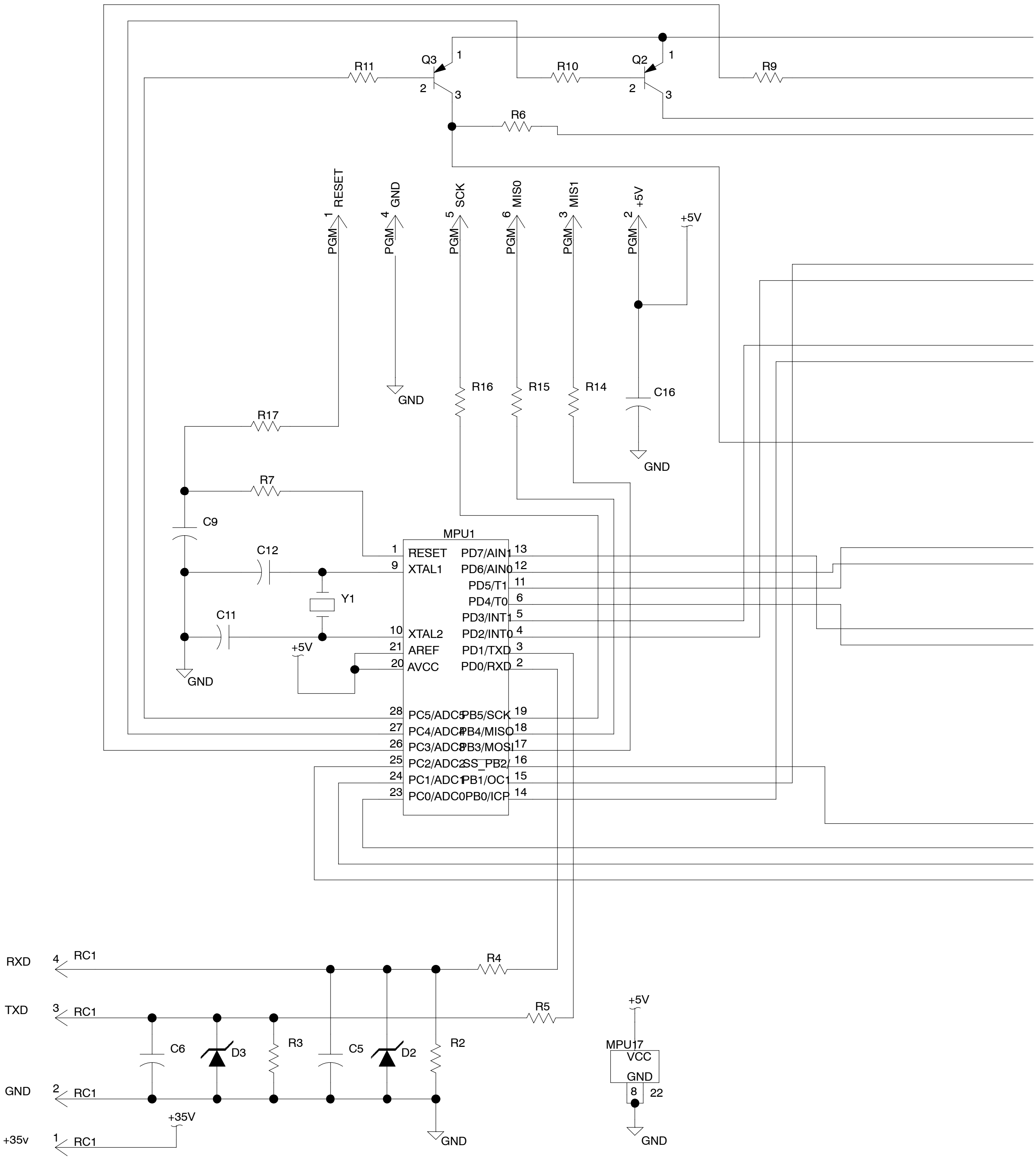
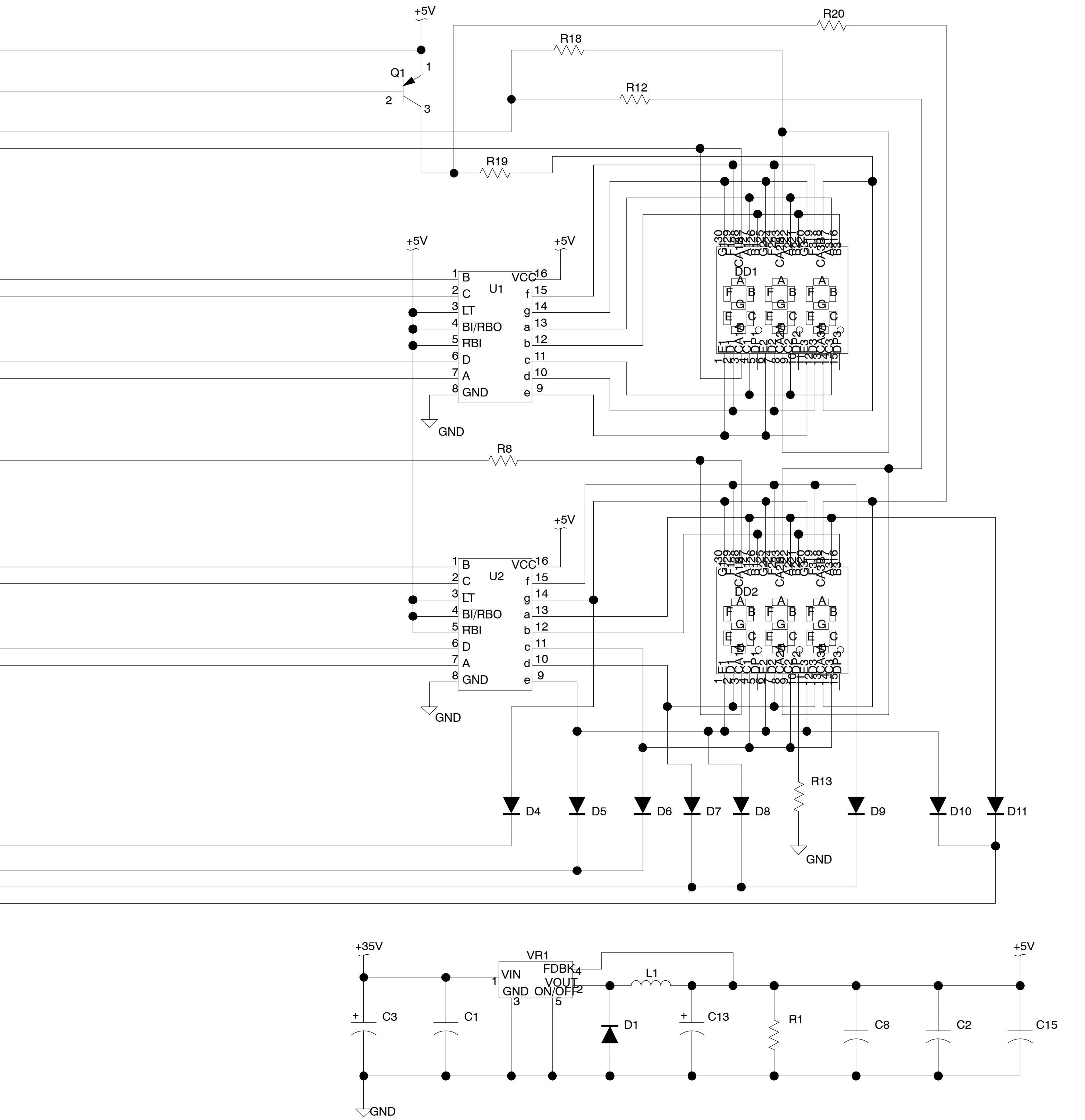


Figure 8-10. Circuit Diagram For Meter Board PC2 Eff w/LF390239B And Following


+5V
R20
R18
Q1
R12
R19
U1
U2
DD1
DD2
R8
R13
D4
D5
D6
D7
D8
D9
D10
D11
GND
+35V
VR1
VIN
GND
ON/OFF
FDBK
VOUT
L1
C3
C1
D1
C13
R1
C8
C2
C15

224 080-B

Table 8-1. Lead List Summary For Millermatic Passport Models Eff w/LE300069

☞ *Table shows physical lead connections and should be used with circuit diagram (table replaces wiring diagram).*

	Apply small amount of conductive electric compound (Part No. 603 978) to terminals where factory-applied compound had been present.
	Apply small amount of dielectric grade, nonconductive electric grease (Part No. 146 557) to connectors where factory-applied grease had been present.

Lead	Connections
−−−A	NEGATIVE OUTPUT STUD TO WORK CLAMP
−−BB	DRIVE CASTING TO POSITIVE OUTPUT
0002A	POWER SWITCH INSIDE LEAD TO TE1 (2)
0002B	CR1 (N.O.) TO TE1 (1)RC10 (1)
0003A	POWER SWITCH OUTSIDE LEAD TO TE1 (5)
0003A	TE1 TO FAN MOTOR
0008A	PLG1 (9) TO GS1
0008B	CONTACTOR COIL TO PLG1 (1)
0008C	PLG8 (1) TO PLG9 (1)
0010A	PLG1 (10) TO GS1
0011A	PLG2 (1) TO PLG1 (11)
0012A	PLG2 (4) TO PLG1 (2)
0016A	MOTOR PLUG (1) TO PLG1 (20)
0017A	PLG11 (1) TO PLG1 (7)
0019A	CR1 COIL A TO PLG1 (16)
0019A	RC1 (2) TO PLG3 (5)
0020A	CR1 COIL B TO PLG1 (18)
0034A	PLG3 (2) TO RC7 (D)
0035A	RC7 (E) TO PLG3 (1)
0036A	RC7 (F) TO PLG3 (10)
0040A	RC1 (1) TO PLG3 (3)
0042A	PLG2 (3) TO PLG1 (15)
0042D	PLG11 (2) TO PLG1 (12)
0042E	PLG2 (2) TO PLG1 (13)
0042F	PLG8 (4) TO PLG9 (2)
0042G	PLG3 (9) TO RC7 (H)
0043A	C5 (NEG) TO RECTIFIER HEAT SINK
0043B	RECTIFIER HEAT SINK TO NEG OUTPUT
0043C	RECTIFIER HEAT SINK TO R1
0043D	C5 (NEG) TO PLG1 (5)
0044B	SECONDARY C.T. XFMR TO C5 (POS)
0044C	CONTACTOR (TOP) TO SECONDARY CENTER TAP
0044D	XFMR CENTER TAP TO R1
0044E	T1 (CENTER TAP) TO PLG1 (14)
0044F	CONTACTOR (TOP) TO CONTACTOR (TOP)
0045	CR1 N.O. (4) TO CR1 WIPER (9)
0046A	POSITIVE OUTPUT STUD TO PLG1 (14)
0047A	RC7 (G) TO PLG3
0051A	CONTACTOR (BOTTOM) TO CONTACTOR (BOTTOM)
0051B	CONTACTOR (BOTTOM) TO Z1 CONTROL WINDING (ENDING)
0052A	PLG3 (4) TO RC7 (B)
0059	MOTOR PLUG (2) TO PLG1 (19)
0060A	PLG8 (3) TO PLG9 (4)
0061A	PLG8 (3) TO PLG9 (4)
0067A	CR1 (WIPER) TO FM1
0068A	PLG3 (6) TO RC7 (J)
0069A	PLG3 (11) TO RC7 (I)
0079A	CONTACTOR COIL TO PLG1 (8)

TM-1326B 2006−10

Eff. w/Serial Number LB170597

Processes

MIG (GMAW) Welding

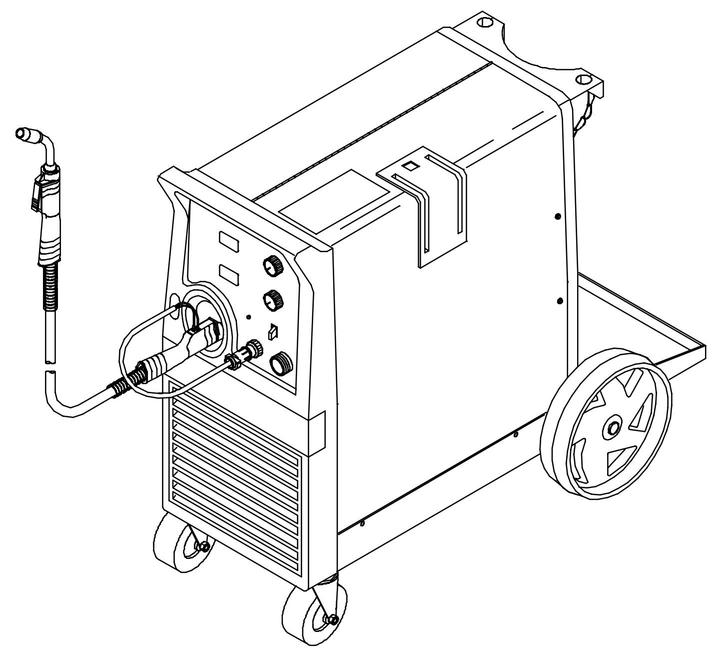
Flux Cored (FCAW) Welding

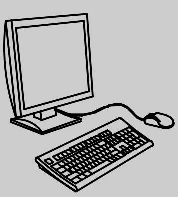
Description

CV DC 1 Phase

Arc Welding Power Source
and Wire Feeder

Millermatic® 251





Visit our website at

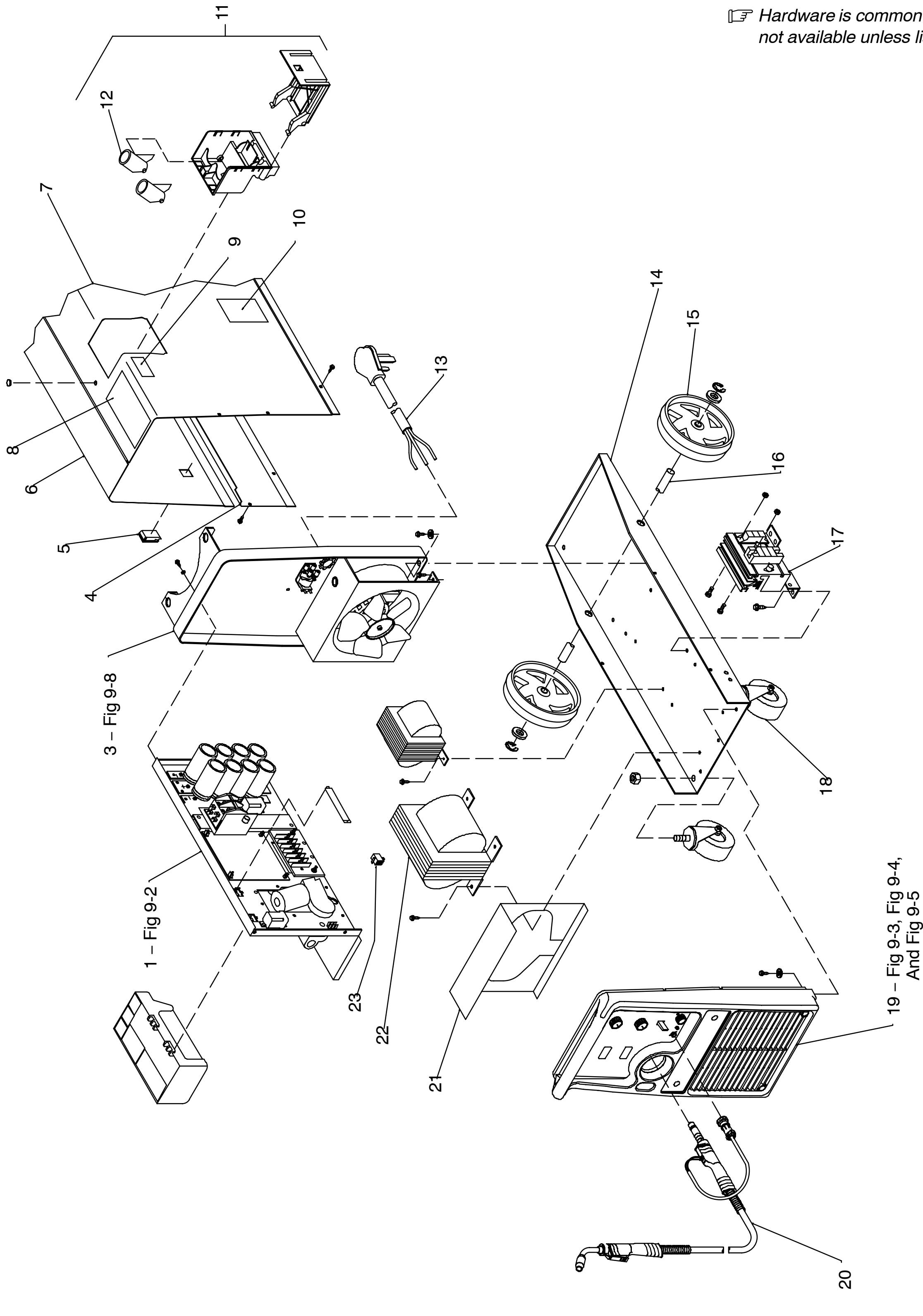
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PARTS LIST

File: MIG (GMAW)

SECTION 9 – PARTS LIST

☞ *Hardware is common and not available unless listed.*



803 008-C

Figure 9-1. Main Assembly

Item No.	Dia. Mkgs.	Part No.	Description	Quantity

Figure 9-1. Main Assembly

1		Fig 9-2	BAFFLE, center w/components	1
2	Z1	222 476	STABILIZER	1
3		Fig 9-8	PANEL, rear w/components	1
4		203 481	PANEL, side LH	1
5		151 187	LATCH, slide flush mtg hole 1.000 wide x 1.500 lg	2
6		203 480	DOOR, hinged	1
		210 615	LABEL, parameter/consumable/polarity	1
7		+203 482	WRAPPER	1
8		134 464	LABEL, warning general precautionary	2
9		201 019	LABEL, warning electric shock excess weight	1
10		168 384	LABEL, warning electric shock and incorrect input	1
11		200 923	GUN/CABLE HOLDER, (consisting of)	1
12		200 921	HOLSTER, gun/cable holder	2
13		188 911	CABLE, pwr 250v 6-50p 8-10ga 3/c 12ft for 200/230	1
13		187 255	CABLE, pwr 250v t tng 8-10ga 3/c 12ft for 230/460/575 or 230/400	1
		199 823	LABEL, warning electric shock power cord	1
14		146 161	BASE	1
15		186 758	WHEEL	2
16		052 692	AXLE, running gear (consisting of)	1
		121 614	RING, retaining ext .750 shaft x .085grv depth	2
17		229 170	KIT, rectifier w/hardware (Prior to LG180693B)	1
17		228 411	RECTIFIER, SCR main (consisting of)	1
	SR1	197 698	THYRISTOR, SCR module 300A 400V common anode	1
	C3,4	031 689	CAPACITOR, rectifier	2
	T	173 632	THERMISTER, 30K @ 25C	2
		205 946	FOOT, mtg rectifier	2
	PLG5	115 094	HOUSING PLUG & SKTS (4 position)	1
18		209870	CASTER, plstc swvl 4 in dia	2
19		Fig 9-3	PANEL, front w/components	1
20		169 596	GUN, 12ft .030-.035 wire	1
21		150 387	BAFFLE, air	1
22	T1	228 714	TRANSFORMER, pwr main (200/230)	1
22	T1	228 716	TRANSFORMER, pwr main (230/460/575)	1
22	T1	205 896	TRANSFORMER, pwr main (230/400)	1
23	PLG2	110 760	HOUSING RECEPTACLE & SOCKETS (harness)	1
	PLG4	110 759	HOUSING RECEPTACLE & SOCKETS (xfmr)	1
		209123	REGULATOR/FLOWMETER, 10-50 CFH Argon/Mixed	1
		196 328	CABLE, work 10' w/clamp and boot (consisting of)	1
		130 750	CLAMP, ground 350A	1
		600 318	CABLE, weld cop strd No. 3 (order by ft)	10ft
		196 318	COVER, cable btry post blk .75 ID	1
		144 108	HOSE, gas	1
		♦212 492	REGULATOR/FLOWMETER, 10-50 CFH CO_2	1

+When ordering a component originally displaying a precautionary label, the label should also be ordered.
♦OPTIONAL

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

☞ *Hardware is common and not available unless listed.*

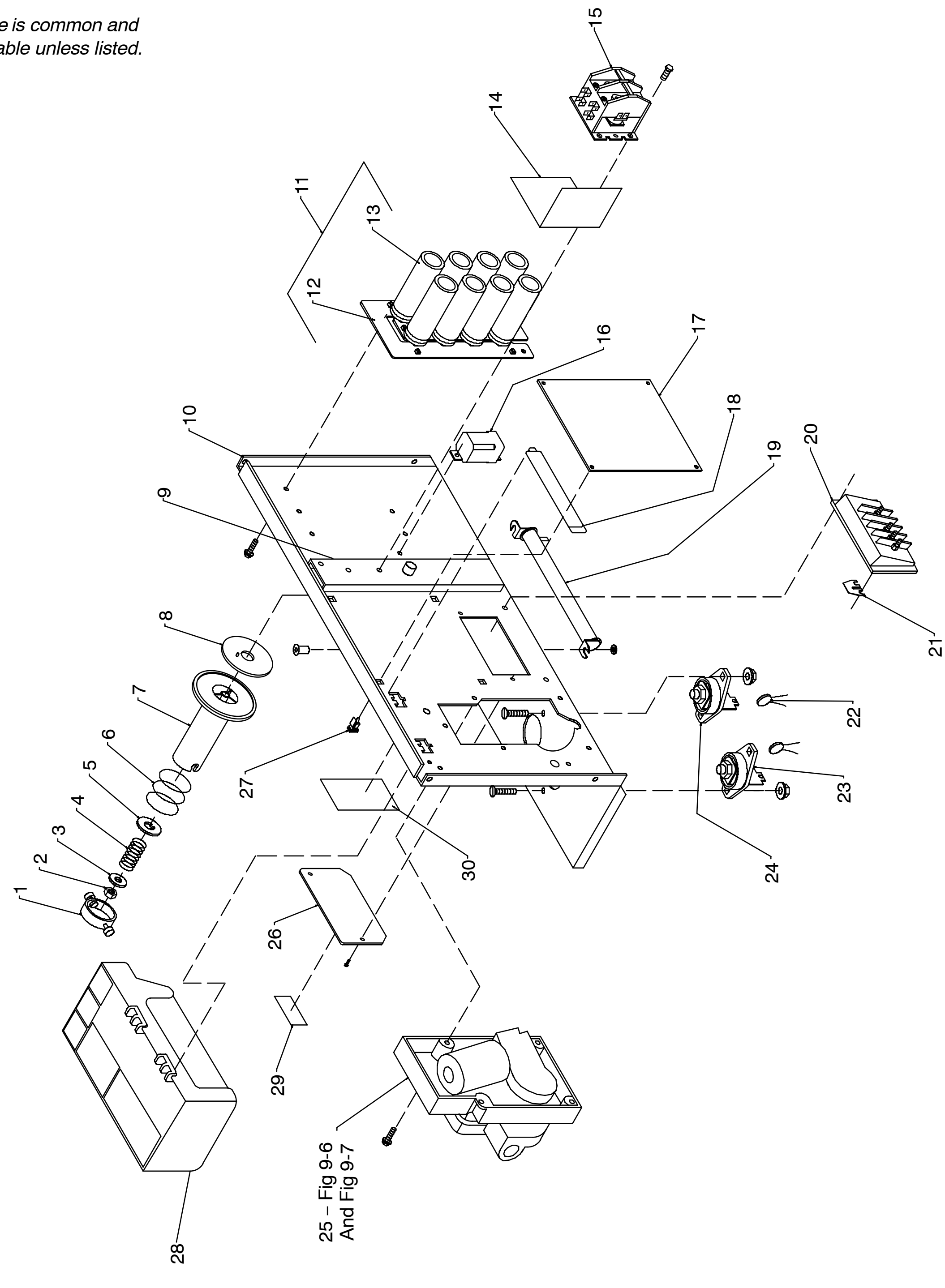


Figure 9-2. Baffle, Center w/Components

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
			Figure 9-2. Baffle, Center w/Components (Fig 9-1 Item 1)	
1		058 427	RING, retaining spool	1
2		085 980	NUT, stl hex full .625-11	1
3		605 941	WASHER, flat stl .640 ID x 1.000 OD x 14ga thk	1
4		186 437	SPRING, cprsn .845 OD x .110 wire x 1.500	1
5		057 971	WASHER, flat stl keyed 1.500dia x .125thk	1
6		057 745	SPRING, cprsn 2.430 OD x .090 wire x 2.500	1
7		186 435	HUB, spool	1
8		186 436	WASHER, brake	1
9		177 307	REEL, support	1
		198425	CAP, finishing 1.19 X .37	2
		198426	WASHER, cap	2
10		196 797	BAFFLE, center (Prior to LC297991)	1
10		211 413	BAFFLE, center (Eff w/LC297991))	1
11		186 998	CAPACITOR ASSEMBLY KIT, (consisting of)	1
12		229 801	KIT, capacitor bus bar and insulator	1
		083 147	GROMMET, scr No. 8/10 panel hole .312sq .500 high	6
13	C5	184 584	CAPACITOR, elctlt 15000uf 45VDC	8
14		204 318	BRACKET, mtg	1
15	W	204 319	CONTACTOR, def prp 25A 2P 36VDC	1
16	CR1	052 964	RELAY, 24V DPDT 10A/120VAC	1
	VR1	144 425	VARISTOR, w/leads	1
17	PC1	220 069	CIRCUIT CARD, control	1
	PLG1	162 382	HOUSING PLUG & SOCKETS	1
	PLG3	130 203	HOUSING RECEPTACLE & SOCKETS	1
	PLG7	115 092	HOUSING RECEPTACLE & SOCKETS	1
	PLG8	115 093	HOUSING PLUG & SOCKETS	1
18		196 894	COVER	1
19	R1	119 998	RESISTOR, WW fxd 300W 5 ohm	1
20	TE1	188 910	TERMINAL ASSEMBLY, pri 1ph double voltage (200/230 or 230/400)	1
20	TE1	192 907	TERMINAL ASSEMBLY, pri 1ph triple voltage (230/460/575)	1
21		038 618	LINK, jumper term bd pri	as req.
22	C7,8	128 750	CAPACITOR	2
23	POS	097 421	TERMINAL, pwr output red	1
24	NEG	097 416	TERMINAL, pwr output black	1
	CB1	180 912	CIRCUIT BREAKER, man reset 1P 5A 250VAC (Prior to LC297991)	1
		200 547	SWITCH, reed (Prior to LC141473)	1
25		Fig 9-6	WIRE DRIVE & GEARS	1
26		188 917	DOOR, access changeover	1
27		134 201	STAND-OFF SUPPORT, PC card	4
28		197 555	TOOL TRAY	1
29		021 469	LABEL, warning high voltage	1
30		216 830	LABEL, warning electric shock and pinch points	1

+When ordering a component originally displaying a precautionary label, the label should also be ordered.

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
			Figure 9-3. Panel, Front w/Components (Fig 9-1 Item19) (Prior to LC198564)	
1		+196 798	PANEL, front control	1
		205 637	LABEL, nameplate	1
2		205 717	CIRCUIT CARD ASSY, display	1
	PLG9	115 094	PLUG w/SOCKETS	1
3		134 201	STANDOFF	4
4		196 801	BRACKET, mtg display board	1
5	C9,10,18, 19,20	136 735	CAPACITOR, cer disc .1uf 500VDC	5
6	R2,3	198 087	POTENTIOMETER (Prior to LC245943)	2
	PLG7	115 092	HOUSING RECEPTACLE & SOCKETS	1
7		186 473	PANEL, front	1
8	S1	128 755	SWITCH, tgl	1
9	RC1	048 282	RECEPTACLE w/SOCKETS	1
10	RC7	190 363	RECEPTACLE w/SOCKETS	1
11		186 470	PANEL, logo	1
12		038 502	Cable Tie,	1
13		186 472	PANEL, louver (Order Item 9, Cable Tie when ordering louver panel)	1
14		193 632	NUT, 375-16 .56 hex .34H stl	2
15		097 924	KNOB, pointer 1.625dia x .250 ID (Prior to LC245943)	2

☞ *Hardware is common and not available unless listed.*

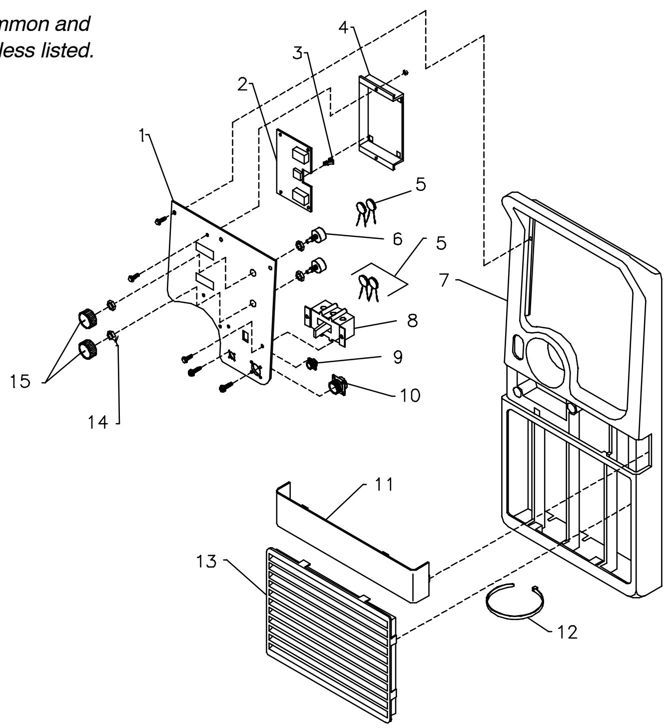


Figure 9-3. Panel, Front w/Components (Prior to LC198564)

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
			Figure 9-4. Panel, Front w/Components (Fig 9-1 Item19) (Eff w/LC198564 thru LG350555B)	
1		208 357	LABEL, nameplate	1
2		209 561	CIRCUIT CARD ASSY, display (Prior to LF390239B)	1
2		224 075	CIRCUIT CARD ASSY, display (Eff w/LF390239B)	1
	PLG9	115 094	PLUG w/SOCKETS	1
3		134 201	STANDOFF	4
4		196 801	BRACKET, mtg display board	1
5	C9,10,18,			
	19,20	136 735	CAPACITOR, cer disc .1uf 500VDC	5
6	R2,3	208 207	POTENTIOMETER (LC245943 thru LC525911, and Eff w/LC526085)	2
6	R2,3	198 087	POTENTIOMETER (LC525912 thru LC526084)	2
	PLG7	115 092	HOUSING RECEPTACLE & SOCKETS	1
7		208 166	PANEL, front	1
8	S1	128 755	SWITCH, tgl	1
9	RC1	048 282	RECEPTACLE w/SOCKETS	1
10	RC7	190 363	RECEPTACLE w/SOCKETS	1
11		208 167	LABEL, logo	1
12		208 164	PANEL, front bezel	1
13		193 632	NUT, 375-16 .56 hex .34H stl	2
14		207 077	KNOB, pointer 1.625dia (LC245943 thru LC525911, and Eff w/LC526085)	2
14		097 924	KNOB, pointer 1.625dia x .250 ID (LC525912 thru LC536084)	2
15		129 524	TERM, frict 250 x 032	1

☞ *Hardware is common and not available unless listed.*

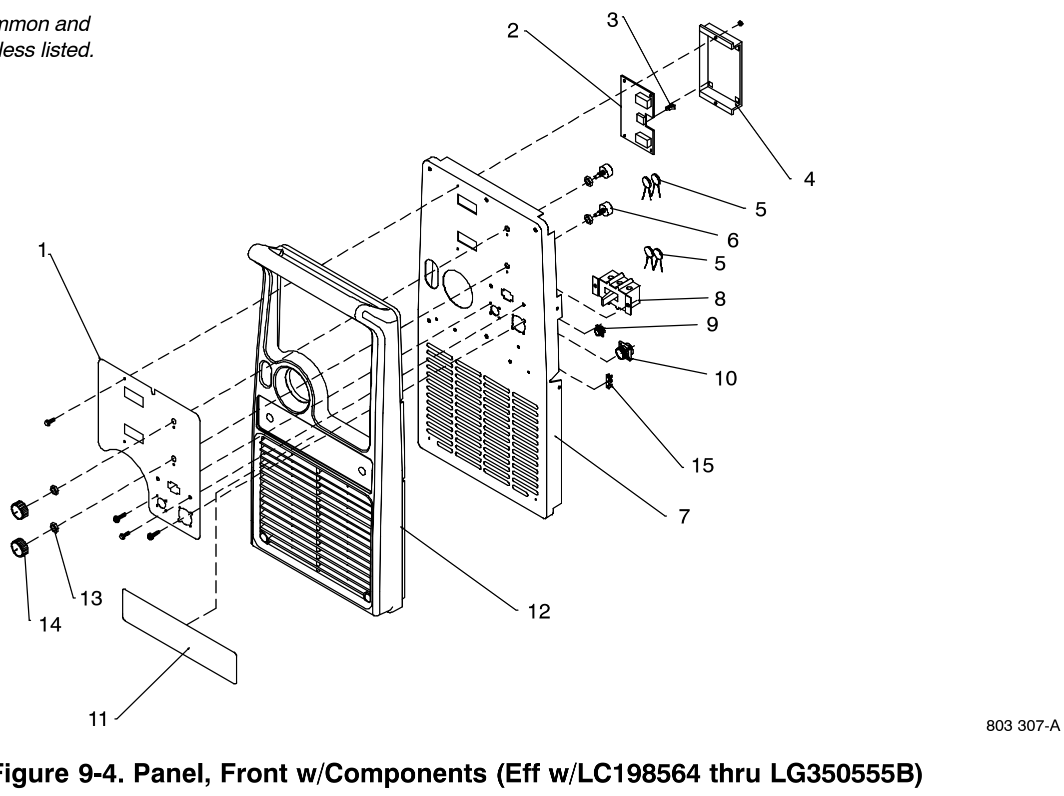
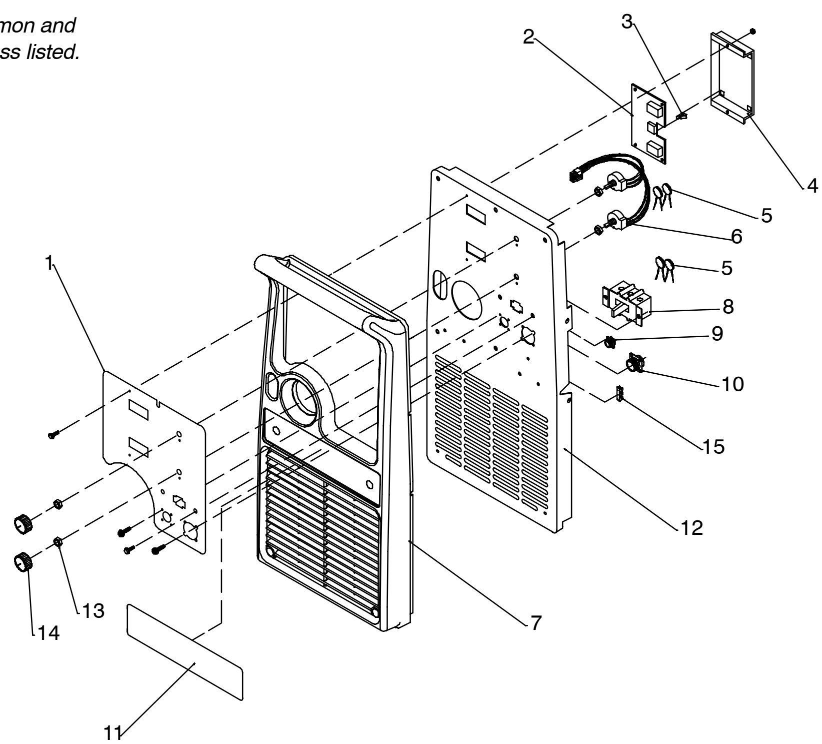


Figure 9-4. Panel, Front w/Components (Eff w/LC198564 thru LG350555B)

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
			Figure 9-5. Panel, Front w/Components (Eff w/LG350556B) (Fig 9-1 Item 19)	
1		208 357	LABEL, nameplate	1
2		224 075	CIRCUIT CARD ASSY, display	1
	PLG9	115 094	PLUG w/SOCKETS	1
3		134 201	STANDOFF	4
4		196 801	BRACKET, mtg display board	1
5	C9,10,18, 19,20	136 735	CAPACITOR, cer disc .1uf 500VDC	5
6	R2,3	228 103	POT ASSY, w/leads & connector	1
	PLG7	115 092	HOUSING RECEPTACLE & SOCKETS	1
7		208 164	PANEL, front bezel	1
8	S1	128 755	SWITCH, tgl	1
9	RC1	048 282	RECEPTACLE w/SOCKETS	1
10	RC7	190 363	RECEPTACLE w/SOCKETS	1
11		208 167	LABEL, logo	1
12		208 166	PANEL, front	1
13		193 632	NUT, 375-16 .56 hex .34H stl	2
14		207 077	KNOB, pointer 1.625dia	2
15		129 524	TERM, frict 250 x 032	1

☞ *Hardware is common and not available unless listed.*



803 307-B

Figure 9-5. Panel, Front w/Components (Eff w/LG350556B)

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
Figure 9-6. Wire Drive And Gears (Prior to LF430261B) (Fig 9-2 Item 25)				
1		602 009	SCREW, .250-20 x 1.25 soc hd gr 8	1
2		172 075	CARRIER, drive roll w/components	1
3		166 072	SPACER, gear	1
4		010 224	PIN, spring CS .187 x 1.000	1
5		182 788	HOUSING, adapter gun/feeder	1
6		085 242	FASTENER, pinned	1
7		085 244	WASHER, cupped stl .328 ID x .812 OD x .125 lip	1
8		196 896	CUP, spring	1
9		196 897	SPRING, cprsn .695 OD x .095 wire	1
10		196 895	KNOB, tension adj	1
11		166 071	LEVER, mtg pressure gear	1
12		204 510	PIN, hinge	1
13		151 828	PIN, cotter hair .054 x .750	1
14		173 616	COVER, right angle motor	1
15	M	173 435	MOTOR, gear 24VDC (consisting of)	1
		193 633	KEY, woodruff .118 x .380	1
		193 634	WASHER, wave .405 ID x .740 OD	2
		193 635	RING, rtng ext .394 shaft x	1
16		079 633	FITTING, hose brs barbed M 3/16tbg	1
17		601 966	SCREW, .375−16 x 1.25hexhd	2
18		604 538	WASHER, flat stl SAE .312	1
19		204 585	KNOB, fluted	1
20		173 619	CARRIER, drive roll w/components	1
21		174 609	SCREW, M 4−.7 x 12	1
22		174 610	SCREW, M 6−1.0 x 20 soc hd	3
23		192 029	WASHER, flat .250 ID x .437 OD	3
24		173 620	BUSHING, motor mtg	3
25		602 243	WASHER, flat .438 ID X 1.00 OD	1
26		602 213	WASHER, lock .380 ID X .683 OD	1
		*045 233	GUIDE, anti-wear	1

See Table 7−1
Drive Roll & Wire Guide Kits.

☞ *Hardware is common and not available unless listed.*

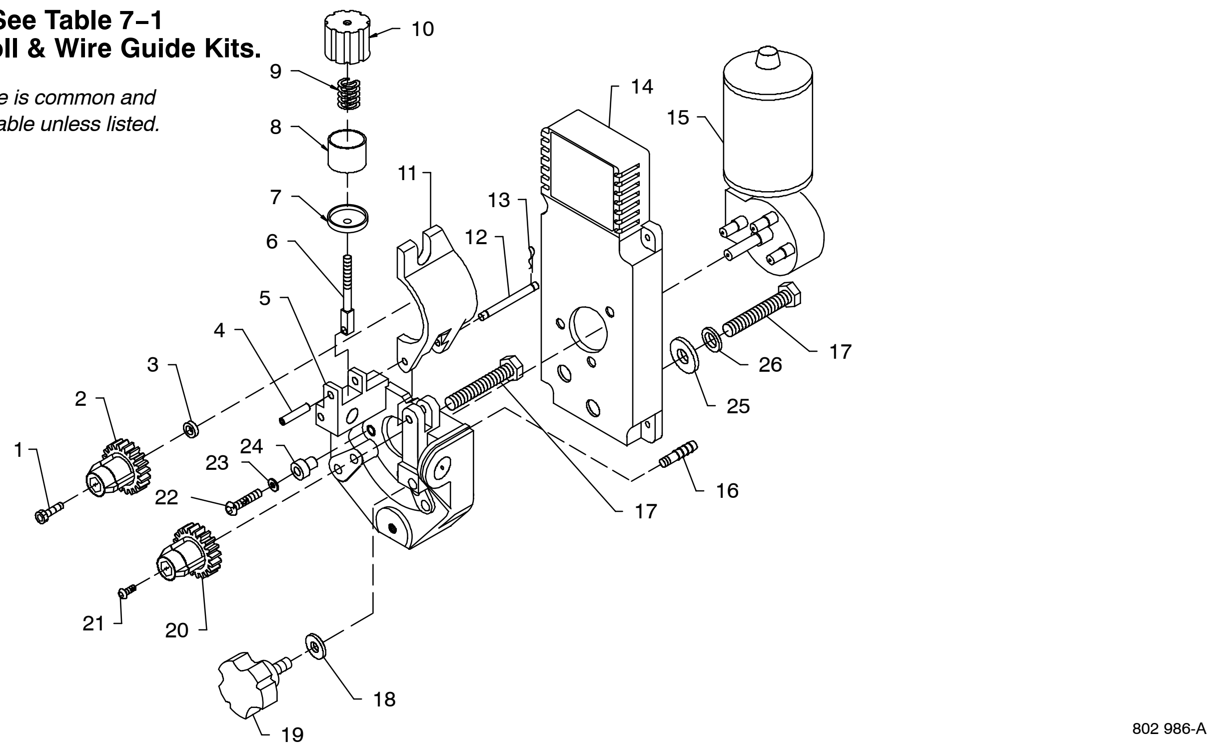


Figure 9-6. Wire Drive And Gears (Prior to LF430261B)

*Recommended Spare Parts.

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

Item No.	Dia. Mkgs.	Part No.	Description	Quantity

Figure 9-7. Wire Drive And Gears (Eff w/LF430261B)
(Fig 9-2 Item 25)

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
1		602 009	SCREW, .250-20 x 1.25 soc hd gr 8	1
2		172 075	CARRIER, drive roll w/components	1
3		166 072	SPACER, gear	1
4		010 224	PIN, spring CS .187 x 1.000	1
5		182 788	HOUSING, adapter gun/feeder	1
6		225 718	FASTENER, pinned	1
7		196 896	CUP, spring	1
8		196 897	SPRING, cprsn .695 OD x .095 wire	1
9		196 895	KNOB, tension adj	1
10		166 071	LEVER, mtg pressure gear	1
11		204 510	PIN, hinge	1
12		151 828	PIN, cotter hair .054 x .750	1
13		173 616	COVER, right angle motor	1
14		227 117	KIT, motor (including)	1
	M	225 341	MOTOR, gear 24VDC (including)	1
		193 633	KEY, woodruff .118 x .380	1
		193 634	WASHER, wave .405 ID x .740 OD	2
		193 635	RING, rtng ext .394 shaft x	1
15		079 633	FITTING, hose brs barbed M 3/16tbg	1
16		601 966	SCREW, .375−16 x 1.25hexhd	2
17		604 538	WASHER, flat stl SAE .312	1
18		204 585	KNOB, fluted	1
19		173 619	CARRIER, drive roll w/components	1
20		174 609	SCREW, M 4−.7 x 12	1
21		174 610	SCREW, M 6−1.0 x 20 soc hd	3
22		192 029	WASHER, flat .250 ID x .437 OD	3
23		173 620	BUSHING, motor mtg	3
24		602 243	WASHER, flat .438 ID X 1.00 OD	1
25		602 213	WASHER, lock .380 ID X .683 OD	1
26		*221 912	GUIDE,WIRE INLET	1
		203526	ROLL,DRIVE V GROOVE .030/.035 COMB WIRE	2

see Section 9-9
Drive Roll & Wire Guide Kits.

☞ *Hardware is common and not available unless listed.*

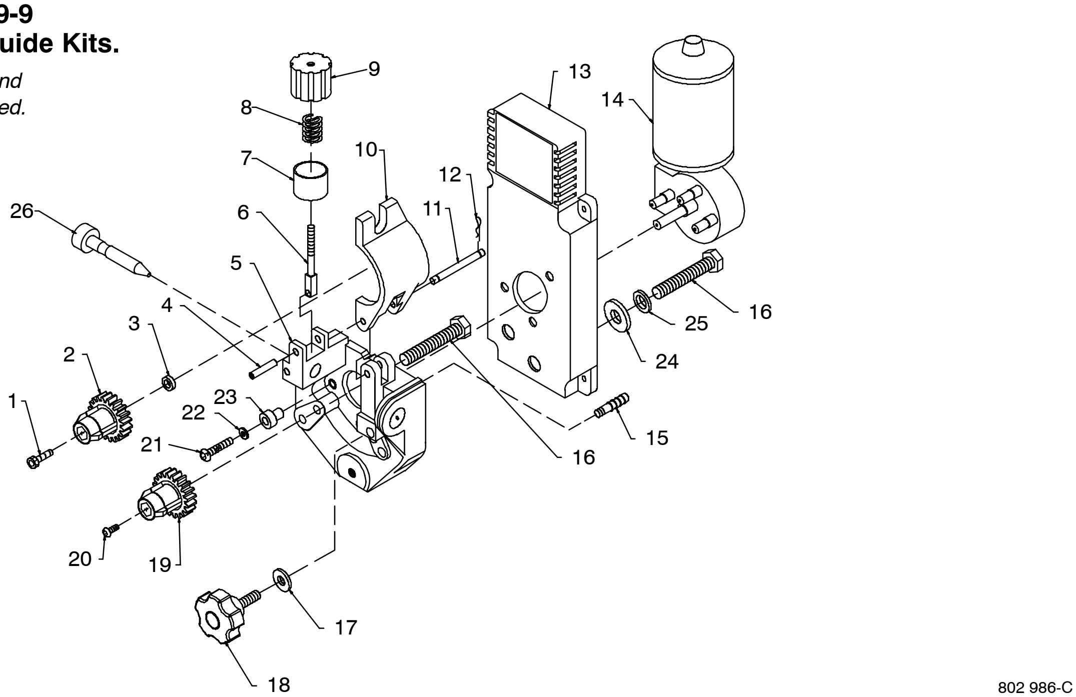


Figure 9-7. Wire Drive And Gears (Eff w/LF430261B)

*Recommended Spare Parts.

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
Figure 9-8. Panel, Rear w/Components (Fig 9-1 Item 3)				
1		148 809	BLADE, fan 9 in 5wg 34deg .309 bore CCW	1
2	FM1	188 706	MOTOR, fan 230V 50/60 Hz 1550RPM .312dia shaft	1
3		203 711	WINDTUNNEL	1
4	GS1	200 333	VALVE, 34VDC 2 way custom port 1/8 orf (Prior to LE097827)	1
4	GS1	216 395	VALVE, 34VDC 2 way custom port 1/8 orf w/frict (Eff w/LE097827)	1
5		203 478	PANEL, rear	1
6		169 654	+BRACKET, support tank	1
		200 285	LABEL, warning cylinder may	1
7		188 441	CHAIN, weldless 2/0 x 31.000 lg	1
8		605 227	NUT, nyl hex jam .750NPST (Prior to LE097827)	1
8		137 761	NUT, 750NPT 1.31hex .27H nyl blk (Eff w/LE097827)	1
9		604 102	CONNECTOR, clamp cable .690/1.070	1

☞ *Hardware is common and not available unless listed.*

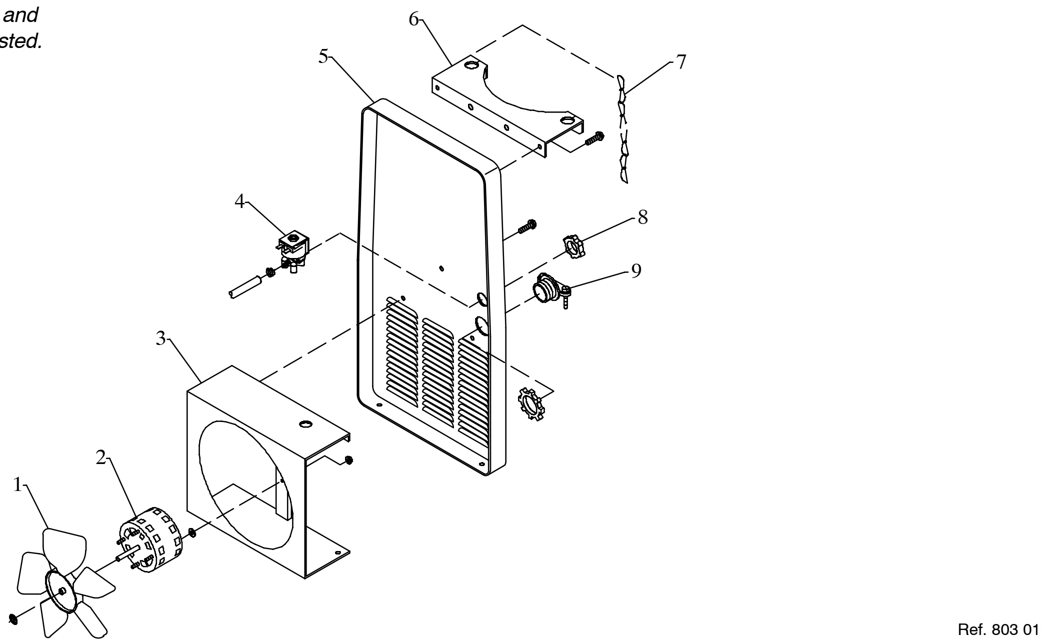


Figure 9-8. Panel, Rear w/Components

+When ordering a component originally displaying a precautionary label, the label should also be ordered.

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

9-9. Drive Roll And Wire Guide Kits

Note

Base selection of drive rolls upon the following recommended usages:

1 V-Grooved rolls for hard wire.

2 U-Grooved rolls for soft and soft shelled cored wires.

3 U-Cogged rolls for extremely soft shelled wires (usually hard surfacing types).

4 V-Knurled rolls for hard shelled cored wires.

5 Drive roll types may be mixed to suit particular requirements (example: V-Knurled roll in combination with U-Grooved).

Wire Diameter			Kit No.	Drive Roll		Inlet Wire Guide
Fraction	Decimal	Metric		Part No.	Type	
.023/.025 in.	.023/.025 in.	0.6 mm	087 131	087 130	V-Grooved	056 192
.030/.035 in.	.030/.035 in.	0.8/0.9 mm	204 579	203 526	V-Grooved	056 192
.030 in.	.030 in.	0.8 mm	079 594	053 695	V-Grooved	056 192
.035 in.	.035 in.	0.9 mm	079 595	053 700	V-Grooved	056 192
.045 in.	.045 in.	1.2 mm	079 596	053 697	V-Grooved	056 193

Ref. S-0026-B/7-91

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Miller Electric Mfg. Co.
An Illinois Tool Works Company
1635 West Spencer Street
Appleton, WI 54914 USA

International Headquarters–USA
USA Phone: 920-735-4505 Auto-Attended
USA & Canada FAX: 920-735-4134
International FAX: 920-735-4125

**European Headquarters –
United Kingdom**
Phone: 44 (0) 1204-593493
FAX: 44 (0) 1204-598066

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